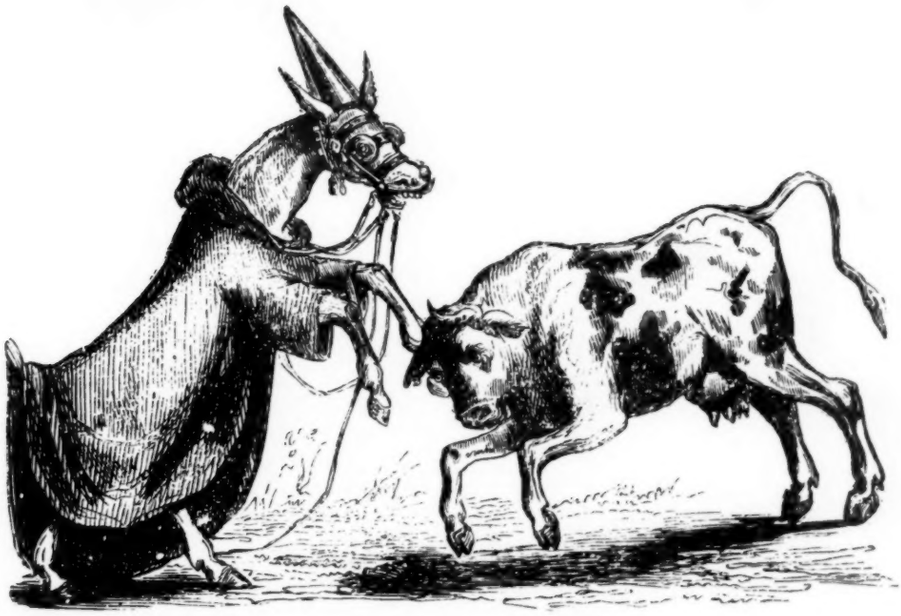

La vaccine aux prises avec la Faculté (*a*).

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THE AMERICAN BEHAVIORAL SCIENTIST

"the proper use of men and measures"

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IN THE NEWS

Long-range plans for the devel. of intl. studies at U. of Michigan have been announced in connection with $3 million Ford F. grant. Of total, $1.58 million will give 10 yr. support to grad. training and res. programs under the U. M. centers for Chinese Studies, Japanese Studies, and Near and Middle Eastern Studies. Balance will give 5 yr. aid to Center for Southern Asian Studies, Center for Russian Studies, Program for Foreign and Comparative Law, Center for Research on Econ. Devel., overseas portion of Program in Business Studies, and Center for Research on Conflict Resolution (details in a forthcoming issue of ABS) . . . A Harvard Study reports ¼ of its budget comes from federal aid, no trouble with government interference, but dangers of imbalances (to be reported more fully in ABS for Jan.) . . . also gave $4.5 millions total to Princeton and Washington U. for international studies emphasizing non-Western areas . . . U. of Michigan Sch. of Social Work rec'd $261M from Russell Sage F. for general beefing up . . . Harvard got $100M for endowment in indus. relations in honor of Kestnbaum from union and from late K's company . . . Dept. of HWE provided $55M to H. T. James (Stanford) for relation between wealth and education expenditures of the States . . . FF gave $100M to Purdue for Urb. Dev. Inst. . . . MIT rec'd $500M from Arthur Sloan for Pol. Sci. Chair on African problems . . .

American U. 7th Inst. on Res. Adminis. postponed for April 23-7, 1962, theme "Organizing for Basic Research", enrollments invited . . . U. of Cal. (Berk.) will continue U. of Bologna program of public admin. with renewed FF grant of $160M . . . Harvard will construct a Visual Arts Center, designed by Le Corbusier, to open fall 1962 . . . Harvard also to set up Office of Latin American Studies under W. S. Barnes to coordinate faculty and support studies in L-A with Kidder-Peabody F grant . . . In international studies, Harvard now has Center for East Asian Studies, C. for Intl Affairs, C. for Middle Eastern S., Intl. Legal Studies Prog., Russian Res. C., and C. for Study of World Religions . . . Columbia U. also announces a new Latin-American Institute to open in Sep. '62 which will complete the U.'s regional study centers that are part of School of International Affairs and Regional Institutes . . . Col. U. also establishes a Res. Inst. on Communist Affairs to study all aspects of communism all over the world . . . Harvard historians Oscar and Mary Handlin announced a 10-yr study of relations between liberty and the production system, forms of government and national character . . . Pres. Pusey meanwhile announced that Harvard for 4th year would stay out of fed. student loan program because of loyalty oath proviso, giving up $250M of otherwise expected aid . . . Prof. A. H. Dupree of U. of Calif. (Berkeley) begins a study of govt. role in science since 1940, under NSF grant.

Robert A. Taft Institute of Govt. sets up program to promote political educ. and combat apathy among Americans by aiding established U.'s and independent adult education programs . . . U. of Southern Calif. will set up a Research Inst. on Communist Strategy and Propaganda under $325M gift from Henry Salvatori asking for "more intensive, scholarly and objective research and communication in this vital area," Institute to be headed by Prof. Swearingen . . . 39 educational and cultural institutions ranging from Canada to North Carolina down the East Coast formed an Educational Radio Network (Cambridge 42, Mass.) . . . Prof. Fisher, U. of Chicago, reports "Before 1958 (Sputnik), only 16 of the 10,000 high schools in the United States taught Russian. Today about 500 schools teach the language." But about 100 schools had dropped the course because of poor preparation. . . . A task force of economists released studies of high school economic education and found it badly off, with unprepared teachers, much propaganda of pressure groups seeping in, and not enough attention to subject; recommended new texts, teacher educ.; offered a quality book list. (ABS wonders whether specialized disciplines can cope with the problems of high school studies and wishes a more coordin-

(continued on page 40)

THE AMERICAN BEHAVIORAL SCIENTIST is published monthly except July and August at Princeton, N.J. It is written by and for social scientists and associated laymen, and carries accounts of inter-disciplinary research, articles on creativity and social invention, comment on the relations between behavioral scientists and society and government, and broad, annotated listings of new studies. It stresses general theory and operationalism, and aims at establishing the role of behavioral science in the modern world. Contributions and comments are invited.

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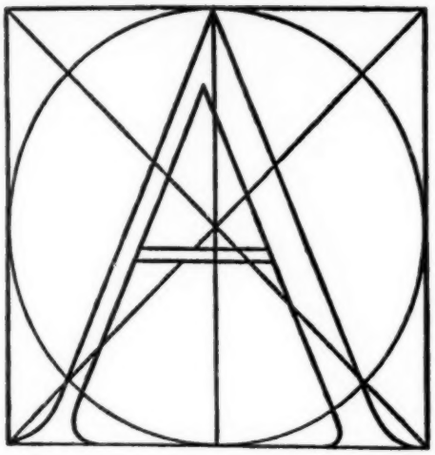

Prospects in Retrospect

By Livio C. Stecchini

Inventiveness

Dr. Stecchini introduces through historical analysis several major problems of the theory of creativity.

An economist, Joseph A. Schumpeter, who built his method of analysis around the concept of innovation, states that the figure of the inventor has become obsolete in our society; his functions have been taken over by bureaucratic research organizations that make the achievement of inventions an automatic process. Schumpeter's remarks about the bureaucratization of the economy are highly perceptive, but his value judgments are biased by a prejudice of Marxist origin according to which any new development must be necessarily good. More probably, the stream of inventiveness is drying up, and a major symptom of it is the current preoccupation with the study of the process and conditions of inventive creativity.

The mathematician Jacques Hadamard in the *Psychology of Invention in the Mathematical Field* ascribes inventions to the activity of the unconscious, whereas the philosopher of science Gaston Bachelard, in *La formation de l'esprit scientifique* considers that psychoanalysis is useful only in studying the negative factors that prevent objective knowledge: he speaks of epistemological blocks. The psychoanalyst Otto Fenichel also seems to think that inventions need freedom from subconscious blocks. He refers to the wisdom contained in ancient mythology: "The hero who solves every riddle must have been wise not so much because of his intelligence but because his emotional freedom, unhindered by repression, enabled him to recognize the hidden truth."

Inventors are those who see new aspects of things. Contrary to Dewey's idea, inventions do not spring from a concern with the solution of pressing problems. The formula of invention has been better stated by the phenomenological method of Husserl: one must free oneself from subjective attitudes, from tradition, from all that he has learned about the object, from conceptions, hypotheses, theories, and must try to look only at the object itself, so as to grasp its essential qualities. As another of my teachers at the University of Freiburg, Heidegger, explained, when we grasp the essence of a thing, we truly own it: the Romans translated by *essentia* the Greek word *ousia* which also means "property, personal ownership." *Ousia*, originally, is the relation of a peasant to his field: essence is something that is under our eyes and under our hands.

On Print, Clocks, and Microscopes

The remark of Schumpeter must be further qualified by distinguishing two types of inventions. The truly important inventions are those that involve a new insight into the processes of nature; these are the inventions that cannot be patented according to our legislation. When printing by movable characters was conceived, its inventors had to cope with a series of difficult problems concerning the characters, the ink, the press, and the handling of the paper. It is amazing how, in the space of a few years, they were able to solve them by devices, many of which could have been patented as inventions. When these secondary inventions are examined, it appears that all the technical conditions for the discovery of the printing press existed already in ancient Greece, as it is indicated also by the fact that the Greeks discovered the striking of coins. Movable characters had been occasionally used to impress clay tablets with cuneiform writing in ancient Mesopotamia. Historians of technology have not yet succeeded in answering the vital question why the printing press was discovered in the fifteenth century and not earlier. I suspect that the new factor was the medieval scholastic debate between realists and nominalists: the victory of the nominalists destroyed the belief in the magical power of words and thereby made possible breaking them into mechanical elements.

For a social scientist there is not an invention more consequential than that of the clock, since it has molded our society and our conception of life (including even the fifty-minute hour of Freud). Only after three centuries of development did mechani-

On the letter "A"

An important social invention is the Roman letters with their beautiful simplicity and regularity. They were developed for Latin inscriptions under the influence of the Pythagorean mathematical rules of proportion used in the architecture of the building on which the inscriptions were cut. Renaissance scholars tried to reconstruct by inference the mathematical rules of the lettering in Roman inscriptions. The letters so recalculated were adopted by Italian printers and gave origin to our Roman letters. The letter here reproduced appeared in the first printed book on the style of ancient Roman letters, the work of Damiano da Moille (Parma, 1480), rediscovered by Leonardo Olschki in 1924.

cal clocks cease to be expensive toys and begin to have some practical utility, and even after that point was reached, they continued to be made more elaborate and precise than "necessary". This is still true today. Clocks were developed because of a preoccupation with cosmic time. This same obsession hovers over the watches worn today, even by wastrels who are known to "kill time." On their wrist is a precision instruments with stops, hands that mark fractions of the seconds and other fine adjustments to eternity; thereby they express their transcendence of the concerns and responsibilities of ordinary life.

The microscope was invented when there was no specific practical demand for it: the drive was to penetrate the ultimate reality of nature. In our age, the individual sciences tend to be concerned with the solution of particular problems in delimited spheres. The cosmic concern with ultimate reality has faded out of scientific thought. It is not, therefore, especially conducive to inventions.

Failure to Apply Inventions and the Fall of Rome

The problem of the causes of the fall of the Roman Empire has always been a favorite topic of Soviet scholars of ancient history. I believe that in the last ten years they have at least approached a final resolution of the hoary debate. The collapse was due to a failure to increase production by the use of inventions based on the achievements of Greek science. Without an increase in production, society could not support the cost of an expensive government plus the cost of the standard of living needed by populations that had to be incorporated into Greco-Roman culture. Soviet historians maintain that technological innovations were not introduced because of the institution of slavery, but this is Marxist dogmatism by which ancient culture must have failed because of the internal contradictions of slave economy. The truth is that by the second century A.D., slavery had ceased to be an important factor of economic life. In intellectual circles, after the the age of Aristotle, slavery, far from being an essential element of the world view, was considered an oddity, like racial discrimination today.

Early Christianity and Invention

Lynn White, Jr., President of the Society for the History of Technology, explained the well-known paradox that the pace of invention became more rapid in the Dark Ages, by stressing the role of Christianity. Christianity would have introduced two new factors: one, a degradation of nature by which nature could be attacked, instead of being worshipped as it was by the ancients; two, a humanitarian bent by which labor-saving devices became desirable. White has done well to lift the issue to the level of social psychology, but, in my opinion, he is not entirely correct in assessing the significance of Christianity. First, inventions do not result from a desire to rape nature: contrary to the common conception that technology consists in doing something *to* things, it consists in bringing forth something that is *in* things; the greatest technological revolution in human history was the use of cultivated plants.

Second, humanitarianism (philanthropia) existed before Christianity. All the institutions of the welfare state were introduced by the Hellenistic states and were taken over by the Roman Empire: free distribution of food, free public services, public education, care for the indigents, make-work projects, pensions for orphans and widows. The rub was that there was not enough wealth to live up to the repeated declarations of principle. Inscriptions document that here and there some rich man, by donating his fortune, succeeded in giving reality to these aspirations in a particular city for a few years. Christianity is related to the fall of the Roman Empire in that, by preaching that this world is a vale of tears and that we are born to suffer, it prepared men's spirits for a practical solution, the lowering of social and economic expectations and aspirations.

The failure to utilize the achievements of Greek science is connected with a development in Greek philosophy by which a century after Plato, the prevailing mood had become skeptic. A complete withdrawal from the great metaphysical problem was experienced. In Rome *philosophy* became "the love of wisdom", personal wisdom, whereas in early Greek thought, *philosophy* had meant the sense of things, "the desire to know about things", to be in communication with them. In Latin, the Greek *philosophia* was translated as *sapientia*, that is, to be a *sapiens*, "wise man," but the Greek word for "wise man" *sophos*, originally meant a "technician." Roman culture was pragmatic and concerned with problems of behavior. Roman Law is very close in spirit to contemporary methodology of science; the present fashion of linguistic analysis is a page torn from the Roman jurists (they wrote essays *de verborum significatione*).The contribution of Christianity is a renewed concern with essences, because of its stress on ultimate reality.

Leonardo, Galileo, Vives, Rank: Penetrating the Essences

Leonardo da Vinci goes into the very heart of the psychology of the inventor:

> Urged on by my eagerness to see the many varied and strange forms shaped by artful nature, I wondered for some time among the shady rocks and finally came to the entrance of a great cavern. At first I stood before it dumbfounded,

knowing nothing of such a thing; then I bent over with my left hand braced against my knee and my right shading my squinting, deep-searching eyes; again and again I bent over, peering here and there to discern something inside; the all-embracing darkness revealed nothing.

Standing there, I was suddenly struck by two things, fear and longing: fear of the dark, ominous cavern; longing to see if inside there was something wonderful. (Ar. 155 r.)

Here, Leonardo reinterprets Plato's image of the cave as a concrete personal experience, evincing the connection between invention and the search for a transcendent reality.

Galileo considers the invention of the alphabet as the most wondrous and the most momentous of human inventions. In a study that I am pursuing on the origin of the alphabet and which I have summarized in ABS (February, 1961), I explain that the alphabet was not constructed for any utilitarian reason: the aim was to relate to the cosmos. In reality, what was discovered was a social and physiological fact: that, in spite of the infinite variety of sounds uttered by men, for the purpose of social communication, they isolate and perceive only a limited number of phonemes (34 in English). This sociological aspect of speech, however, was not clarified for five thousand years; the concept of phoneme is a product of the experimental behavioristic approach to language at the begininng of this century. The alphabet does not reveal anything about the physical cosmos, as it was intended to do, but it reveals a great deal about social cosmos. Morever, it influenced in a fundamental way the methods used to understand the physical cosmos, as, for instance, in the science of chemistry.

Another Renaissance thinker selected the alphabet as the most perfect model of human inventions, the Spanish humanist Juan Louis Vives (1492-1540 A.D.). In his *Fabula de homine (A Fable of Man)*, he relates that once upon a time Jupiter, in order to amuse the gods, arranged a series of theatrical productions in which there was presented the entire structure of the universe. When, finally, the character of man appeared on the stage, the gods forgot about all the rest of the plays and became interested only in him:

There indeed was a mind full of wisdom, prudence, knowledge, reason, so fertile that by itself it brought forth extraordinary things. Its inventions are: towns and houses, the use of plants, stones and metals, the designation and names of all things, which foremost among his other inventions have especially caused wise men to wonder. Next and no less important, with a few letters, he was able to comprise the immense variety of sounds of the human voice . . . This one thing, which is found in no other animal but man, shows his relation to the gods.

Inventors are people who want to be close to the gods, that is, to the ultimate reality of things. Freud disowned his favorite pupil, Otto Rank, when Rank pointed out that the sin of Oedipus in Greek tragedy, is an intellectual sin, the desire to probe into the mysteries of the physical and social cosmos. Traditional society tries to overwhelm with the contumely of incest and murder those who search after essences (see Freud's analysis of Leonardo). The inventor is a subversive figure in that he tries to establish a non-mediated relation with nature.

On Normality

Psychology should stop asking the question "What is normal?" Personality theory requires another orientation. It seems to me that, for purposes of scientific theory construction and also for practicol clinical purposes, a rather different and potentially more fruitful approach can be taken. This would entail the viewpoint that human beings have a variety of potentialities, and that the achievement of certain potentialities may entail certain limitations and that acihevement and limitation vary with conditions.

Consider it is the distant, withdrawn personality who is unable to form close relationships who, it has been said, stands the best chance of enduring the stress of a prolonged flight into space. The suspicious mistrusting individual, difficult to get along with, may, because of these very characterteristics, be an excellent tax inspector, research scientist, or counterintelligence agent. The vain narcissistic personality can become a great entertainer. Revise the point. Is great acting possible without narcissism? Is creative research possible without mistrust? Is prolonged isolation tolerable for a gregarious individual? The legitimate task of science is not to stand back smugly and label the various distributions of energy and effort as abnormal or normal. The task of theoretical psychology is to provide the concepts and principles which would enable us to comprehend achievements and failings *and their interrelationships.*

Such an approach focuses on man's behavior as the data available for scientific study. Existing terms and concepts such as repression, motive, conformity, defense mechanism, and habit need not be discarded as conceptual tools, but with this perspective the scientist does not imply damnation or praise when he uses them to characterize a psychological process. This approach sets no limit on the sophistication of the theories developed to encompass the facts of behavior, but it lessens the likelihood of confounding facts and theories and value assumption. It avoids positing criterion value systems but freely admits the incorporation of value systems as variables contributing to or limiting different potentialities. It sets the stage for research into the development and exercise of man's potentialities for what, on other grounds, may be considered good or evil, but does not prejudge or condemn. It permits the description and understanding of man as he was, is, and can be.

from David Freides, "Toward the Elimination of the Concept of Normality." *Journal of Consulting Psychology*, XXIV (April '60), pp. 130-31

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FIGURE ALLÉGORIQUE DE LA RÉPUBLIQUE.
(D'après Prudhon.)

Elements of Social Invention

by Alfred de Grazia

The Editor of ABS presents briefly his theory of invention as it has emerged from his work at New York University. Given an appropriate set of concepts, a convergence of many disciplines both upon the study of invention and upon the invention of invention, is possible.

Social invention is new applied social science. It consists of new methods of organizing human behavior for stated ends. The first game of chess was a social invention; so was the first constitution, as was the first close-order drill. The first alphabet was, and the first choice of public officials by lot. Today a scheme to withhold income taxes at their source is a social invention, along with the use of quantitative content analysis in the study of documents; so too is the system of communications whereby a land-based machine operated by an officer can guide manned airplanes automatically to their targets. No doubt an extensive survey would reveal many thousands of social inventions.

Inventions as social events

A major theorem in the study of invention is: *Every invention is a social invention.* We are vastly deluded by historical prejudices. The "hardware" sciences emphasize inventions in which many of the relations involve a knowledge of connections among natural objects. The "behavioral" sciences stress inventions in which the larger part of the relations consist of human communications. When an invention is a mixture of both sciences throughout, or a near balance of natural and human factors, it calls for a collaboration of natural and social scientists.

This fact is just beginning to dawn upon consciousness. An evidence of it is the rapid growth of the so-called "systems" approach in research and development, which means essentially that the total context, human and non-human, of a somewhat mechanical device must be understood and provided for if the device is not to fail.

However, we mean more than that human factors are found in many mechanical situations. The human factors can be regarded as the whole of the situation and *the natural scientist, whether he believes it or not, is a behavioral scientist.* That he may believe he is not, that he is reinforced in this view by popular belief and academic discipline, and by the historians of science, may mean merely that an ideological syndrome thrives because of the divisions of science into branches, and affects the processes of thought about technique.

The difference between Euclidian and non-Euclidian geometry is essentially psychological. Newtonian and Einstonian physics are divided by two psychological perspectives of reality. The operations that the several "natural" sciences prescribe as proof and application are behavioral in nature, or at the least may be regarded as such. Every item in a complicated machine is an extension or a a connection between human organs in an attempt to go from human wish to human use. All the "laws of nature" that are used to effectuate the arrangements of parts are human, not only in source, but in content. Any distinction that has been made historically between those sure principles that bring hard objects into relation, and those that join human interactions, is outmoded. It is an inheritance of centuries when man was alternately a slavish worshipper of external nature and an arrogant narcissist. He sought "nature's laws" and then believed "no law ruled his soul".

A more elaborate defense of this position would have to be based upon the dissection and analysis of a series of great "hardware" inventions, as well as of inventions of the type of numbering systems and mathematics, which have been treated hitherto as a class in themselves. But this defense must wait another time. At the moment, having postulated that all inventions are social, we may proceed to discuss *only those inventions that involve a high proportion of direct human contacts as opposed to those that contain intricate mechanical arrangements.* These are conventionally regarded as social inventions and they are actually what most social scientists are specialized in.

On newness and firstness

Other distinctions need to be made, which are no more nor less arbitrary

than their counterparts in the study of "hardware" inventions. If the notion of invention is weak in social affairs, it is not stronger in natural ones. We say: *An invention is a decidedly new application of a set of relations, which may themselves have been known or are newly discovered for this invention.* That is, *the application must not have been previously known or realized in the culture of the inventor.* Furthermore, to be an invention, the application must not be unconscious.

The idea of being "first" is often attacked out of disdain. The juvenile mind likes to dwell upon "first" things and the snob rejects "firstness" as undignified competitiveness. Obviously the quality of "firstness" should be significant beyond its vulgar appeal, and it is. A "first", like a "decision", or a critical historical event, is important as a turn in the course of a process and as a sign that an unusual creative act has occurred. Moreover, if "firsts" can be predicted and controlled, many valuable interests would be served.

A second reason for attacking "firstness" is more valid. Perhaps few things are really first. Certainly most of any invention is a gift of the culture to the inventor. And some concrete relationship and things are so gradually developed that they cannot be said to have had an inventor. If such is the case, so be it. There need be no quarrel. The fact remains that a great many arrangements have come into being from the work of individuals. It is useful to discover what those men are like and how they produced their work.

The "set of relations" referred to in the definition of invention (it may be called a law or proposition also) may have been known earlier, as a scientific discovery. The set of relations might also be a scientific discovery that coincides with the invention. It remains for a later and deeper investigation to say whether more scientific discoveries come from inventions, or inventions from discoveries. We should not hastily accept the word of the highly prestiged "pure" scientist over that of the humble artificer on this point.

On practicality and acceptance

An invention must work, to be called such. That is, the prescribed activities must have a high probability of achieving the results foreseen by the inventor. This probability can be judged experimentally sometimes. It can be judged in practice. Or, if there is no other way, it can be judged theoretically by experts. Thus an invention may not be intended as an immediate social practice. Its assumptions of prior conditions may not be realized and therefore it remains "impractical." It does not go into effect. This means: *Inventions can be sets of symbols whose effect is entirely intermental.* It cannot be entirely intramental to the inventor; it must be communicated to a certain number of people in the culture. "Utopias", wholesale social schemes of an impractical nature, are inventions.

As with the concept of "leader" the concept of *"inventor" means the person whose internal and external activity is observed to determine the invention more than the actions of any other person involved with the invention.* There is no objection, of course, to nominating "co-inventors" when the responsibility seems to be equally divided. Independent invention may happen when two inventions occur without the activity of one inventor being made known by any means to the other inventor. The "date" of an invention is its first significant communication to others in the form of symbols, model, or practice.

The "acceptance" of an invention begins when it is regarded in the universe of its potential practitioners as an acceptable way of behaving. Whence we may use terms such as "peak acceptance", "generally accepted," or "prevalent," if not more precise terms or numbers, to indicate the degree of use of the invention in proportion to all potential uses.

The "importance" of an invention is wholly dependent upon one's values and their hierarchy.

Social change and invention

An understanding of the larger processes of social change aids in the study of invention. Social change is the variation in interpersonal practices over time. Women change the length of their dresses from one year to another. The change may be progressive, that is, towards hitherto unexperienced lengths, or regressive, towards a previously experienced length in the "collective memory" of the culture. "Periods of rapid social change" become then time when the scope and rates of variation in cultural practices are wide and rapid. A number of determinants of social change are known; it is a favorite topic of social scientists: warfare, plagues, crop failures or boon harvests, population growth, diffusion of culture traits, inventions, and migrations of people are among the larger forces that have been studied. In addition, a great number of social practices and events have been studied to determine the kind of change that they bring, as when a tax is increased, education is made compulsory, an alliance is formed, a constitution is introduced, or a new form of collective bargaining is agreed upon.

When social change is deliberately brought about, we refer to "innovation". Otherwise, the carrying on of accepted practices is either "custom" or, when deliberate, "administration."

Inventiveness: individual and organizational

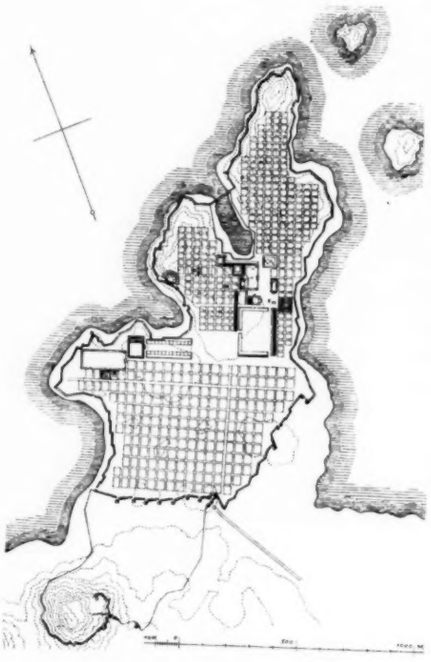
Creativity and inventiveness may be treated as synonyms in that both

require of a person some unexpected combination of relations. The same sorts of investigation that uncover the one are likely to discover the other. However, creativity may well be more restricted term in one sense; if we are interested in the process that brings forth new hypothesis and carries along the hypothesis into the real forms of ideas and practices that may be engaged in by others, then creativity should perhaps be limited to the step of hypothesis, an invention be assigned to the whole two-step process. By the same token, creativity is a broader concept in that it can exercise more fully the hypothetical faculty without regard to consequences. Dylan Thomas would then be a creative poet, but not an inventor. Line for line, he would be more creative, perhaps, than a comparable inventive poet. Dante Alighieri would be an inventor, as well as a creative poet, because of the novel social schemes contained in his writings. Still, with all this, the psychological studies of creativity are an important part of the literature of invention.

Since no one has yet presented a validated theory of the psychology of creativity, we are hard put to state, especially in brief, a theory of individual inventivenes. Similarly, no one has drawn from history an account of the periods of greater social invention, much less explained the dynamics of invention in those periods. One might accept the eras of mechanical progress as coincidental with eras of high social inventiveness, or premise that periods of philosophical fecundity are associated with social inventiveness; there would probably be a general relation, but ultimately a new cyclical chart would be needed.

Four sources of inventiveness

Whether we consider larger social forces or personal traits, we should focus attention upon several major sources of inventiveness. As in the study of all human phenomena, the societal can be reduced to the personal and the personal translated into the societal. *Inventiveness appears to emerge from situations where personal and social conditions of the following types are encountered: high drive (ambition); frequent marginalism; high relationism; and high operationalism.* By high drive is meant that cultures and individuals of high inventiveness make strong demands of their environment, have high hopes and expectations, and value persistence in endeavors. By frequent marginalism, we mean that uncommon views, deviant personality types, and conflicting *Weltanschauung* are endemic in the inventive culture and express themselves through inventive individuals. Relationalism is defined as the ability to perceive connections of all kinds among things and events; it is needed in greater degree for newly combining relations, the salient feature of the invention. High operationalism denotes the strong tendency to regard fulfillment of an idea as requiring its expression in activity.



The Greek city of Miletus was destroyed by the Persians in 494 B.C. (see *ABS*, March 1961, p. 19). On occasion of its rebuilding there was introduced the checkerboard pattern that became standard in Greek city planning. The model was provided by older Mesopotamian and Egyptian procedures. Aristotle (*Politics* II 8) speaks of "Hippodamus . . . a native of Miletus, the same who invented the art of planning cities, and who also laid out the Piraeus,—a strange man, whose fondness for distinction led him into a general eccentricity of life, which made some think him affected (for he would wear flowing hair and expensive ornaments; but these were worn on a cheap, but warm garment both in winter and summer) . . ." Hippodamus, in relation to his plans for an ideal city proposed also an ideal constitution, one of the rules of which was that "those who discovered anything for the good of the state should be honoured". But Aristotle objects that this would encourage "informers" and civil disturbances.

If this general theory is correct, then we should expect current social-psychological studies and statistical surveys, as well as historical studies, to emerge with the same conclusions. That would certainly represent a major step towards the form of inventiveness that can be called the invention of invention. Some major problems in the theory of history and culture would thus be joined to some of the immediately important problems of the marketplace involved in speeding up the processes of invention in research and development. Those who ask: "what caused the almost incredible inventiveness of the Renaissance?" would have the same concepts, the same interchangeable lenses for social and individual study, as those who ask: "what kinds of institutions today foster inventiveness?" The latter are increasingly active. Whole governments and most corporations engage themselves in ambitious programs of accelerating change.

Fields of invention

Every area of human relations becomes then a scene of some activity aimed at new applied social science. Work relations is crowded with movements of human engineering, human relations management, public relations, and advertising. Warfare changes rapidly; the weapons, and human organizations that set their limits and depend in turn upon their mechanical possibilities, are subjected to continuous alteration. Human settlements, particularly the sprawling urban communities of the new world, are the focus of numer-

ous efforts towards improved dwelling, commuting, distribution, recreational, and communication facilities.

Legislative and administrative institutions have not escaped the impetus to rationalization: policy-making and decision-making are becoming self-conscious; the hand of science is seen in the realizing of the logic long inherent in old procedures such as the petit jury and the committee-hearing. The field of social science methodology is itself the center of many inventions, for every new technique of research is an invention in the framework of a science, whose aim is to produce discoveries and applications.

The drive towards positive law, first recognized in the nineteenth century by Dicey and others, proceeds rapidly; it has hardly reached a peak, because it aims at applying the scientific procedure to legislating on matters of public interest. This goal is still far off. The full spirit of positive legislation is the spirit of planning, that is, the belief that where a public problem is sensed, the duty of the government or appropriate non-governmental groups or persons is to locate or invent a way of solving it.

Strangely, there seems to be in recent years a scarcity of legislative and policy plans. There is also a dearth of utopias, the extreme version of planning. Invention today apparently seizes avidly upon the methodological, but shuns the proposal of broad changes, reforms, movements, and plans. Rewards go more to scientific discovery than to invention and more toward mechanically contrived inventions of precise, noncontroversial scope than to inventions that would disturb existing social relations, even while the air is full of pleas for the latter.

The spirit and technique of invention

Social scientists have not yet clarified in their own minds, and therefore not conveyed to the public, the spirit and technique of social invention. Probably John Dewey, during his long evangelism, came closest to expressing the key ideas: rational, tentative intelligence in public affairs; social experiments; full exposure of the direct and indirect consequences of public policies. No institution or myth was to be free from the probings of science.

It may well be that Dewey's efforts fell short of their goal because he himself was incapable of separating the process of invention (and the justification of that process) from his ideology of progress and humanitarian collectivism. If so, we may expect greater success if we make clear that the instruments of invention are not themselves to be masters of controversy, but rather the servants of rationalistic controversy. Many of the public and its leaders fear that, if they subscribe to scientific method and inventiveness on social questions, they must buy a set of prejudices and beliefs that they dislike. Consequently, they will only purchase bits of innovative method, when they can be sure of the self-serving results, and will scorn the general philosophical approach. General progress is thereupon retarded; important problems remain neglected.

Nevertheless, the immediate future holds more of all types of inventions. Inventive character and inventive social organization are becoming better known and can be directed more accurately towards greater achievement. Clearer perception of the nature of social invention will permit an abstracting of the inventive elements of the social process. These can then be emulated. It will tend to produce more inventions in areas where today people would deny the relevance of the concept. This trend can be called the technicalization of social invention. It is like the scientific procedures that lay behind the numerous *discoveries* of the natural and social sciences and behind the *inventions* in "hardware" and human relations of recent times: every advance in social invention, as in all science, requires that the situations being studied for application be fragmentalized until their contribution to the total situation be clearly perceived and a new dynamic construction made.

To take an example, so long as the idea of representation is viewed as a unitary whole, inventiveness is impossible and a host of possibilities are locked up in the exclusive vagueness of the concept. Once the idea of representation is broken down into a hundred elements of discrete, interconnected behaviors, then representation of a type to suit a certain need can be devised. Social invention in this sphere becomes possible.

Ethics of invention

The ethics of invention are the same as the ethics of all applied science. What can be done to man can be "good" or "evil." Improved social science, and improved and increased inventiveness will benefit whoever controls the inventions. Many social scientists and educators, who are themselves convinced that social science will lead to good possibilities, saying "we must control men for the sake of the good", also say that the imbalance of social and natural science invention is bringing one disaster after another to modern man. This is, of course, not true at all. In the first place, social science can be as bad as evil itself. In the second place, natural science inventions are social science inventions, but sometimes, like all inventions and applications, they are intended to do one thing, and happen to do other things. In the third place, a number of other people are perfectly satisfied with the ways in which the hardware inventions are leading society. For this total situation, then, new beliefs, new directions, new knowledge, and different kinds of social invention are the remedy.

An early book-printing shop, sixteenth century Italy.

The Literature of Social Invention

The sources of literature on social invention are numerous, but diffuse. There are many works on social change, a concept popular among all disciplines in one form or another. Quite a few references to inventions of "hardware", such as the ax, ships, iron working, and plastics are to be found. Many studies of famous institutions, such as the family, parliaments, agriculture, and war, occur. The psychology of creativity has achieved widespread attention. Lately the administration of research, with special reference to promoting original creations, has become a popular subject. A great many references on the techniques of the new social sciences are also available.

Insofar as these matters relate to social invention, they are liberally sampled in the bibliography of 346 items that follows. However, the condition of the literature is highly unsatisfactory. It tends to be unfocused, both as regards its special subjects, and as regards a general integration of the field. William Ogburn, who came closest of all to the notion of social invention, leaves us unsatisfied today. His notion of "cultural lag" no longer is viable; it lacks meaning when attacked by functionalist criteria (the "lagging" elements are often more subjectively beneficial than the "progressive" items) and is a remnant of the progressive ideology, masquerading as a scientific concept. On a more general level, Orburn's preoccupation was "hardware" invention, and his interest in social invention was not strong enough to carry him forward in the new area.

The historians of science should have brought forth much of value, but have not attended to the history of social science, and *pari passu*, with the story of social inventions. Lynn White, Livio Stecchini, Giorgio Santillana have had exceptional turns of mind in this respect, but the field remains innocent of even a decent sociology of natural science.

The intellectual groupings most likely to have a foot forward into the area of social invention are the social theorists and the students of research and development programs. These disparate types have a natural interest in the subject. The social theorist is occupied with the origin, spread and change of great ideas on epistemology, government, and progress. The latter is concerned with eliciting new forms of work from human groups. Theorists such as Mannheim, Wallas, and Merriam mingle with psychologists such as Lippitt, Stein, and Ghiselin in the bibliography.

Perhaps under the concept of social invention a certain degree of publicly beneficial unity of outlook may develop between these two, and other, groups. The use of social science in all phases of social activity—in government, industry, and voluntary associations—is increasing rapidly. The need for a revised conception of invention to take in the "system" aspect of technological, "hardware" innovation is great. By viewing all invention as social, all invention should be made more complete, satisfying, and controllable Larger schemes would acquire the concreteness of the little idea, while smaller inventions would possess the perspectives of the large. Rationalistic public and private policy would be fostered, and the possibilities of liberty enhanced even as "controls come under control".

The collection of studies presented here is, therefore, more of an invitation to view a new field than a summary of an old. It has developed out of the work of the Editor of ABS in a course on Social Invention offered jointly by the Departments of Government and Sociology and Anthropology, at the Graduate School of Arts and Sciences of New York University. The annotation of the studies was in great part undertaken by members of the class who may be named and thanked here: Joshua Adler; Mirella Baroni; Henry Brehn; John Bresnin; Ira Cohen; Edward

Creiner; Everett Forbes; Russell Fryer; Mrs. Robert Hougham; Martin Kernahan; Stanley Kyriakides; Michel Lissek; Yaw Manu; Sara Singman; Marvin Surkin; Ivo Vukcevich; Matthew Wohl.

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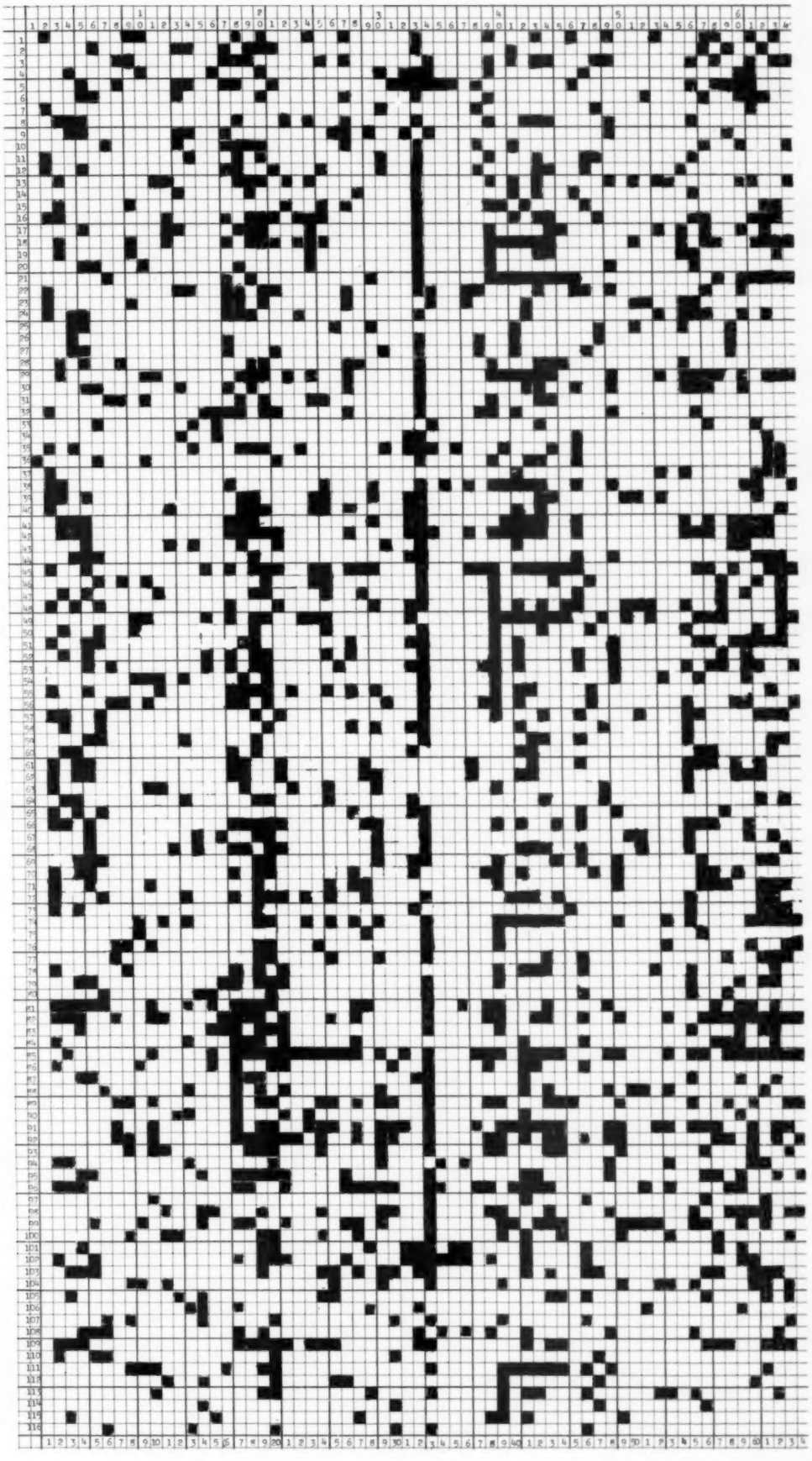
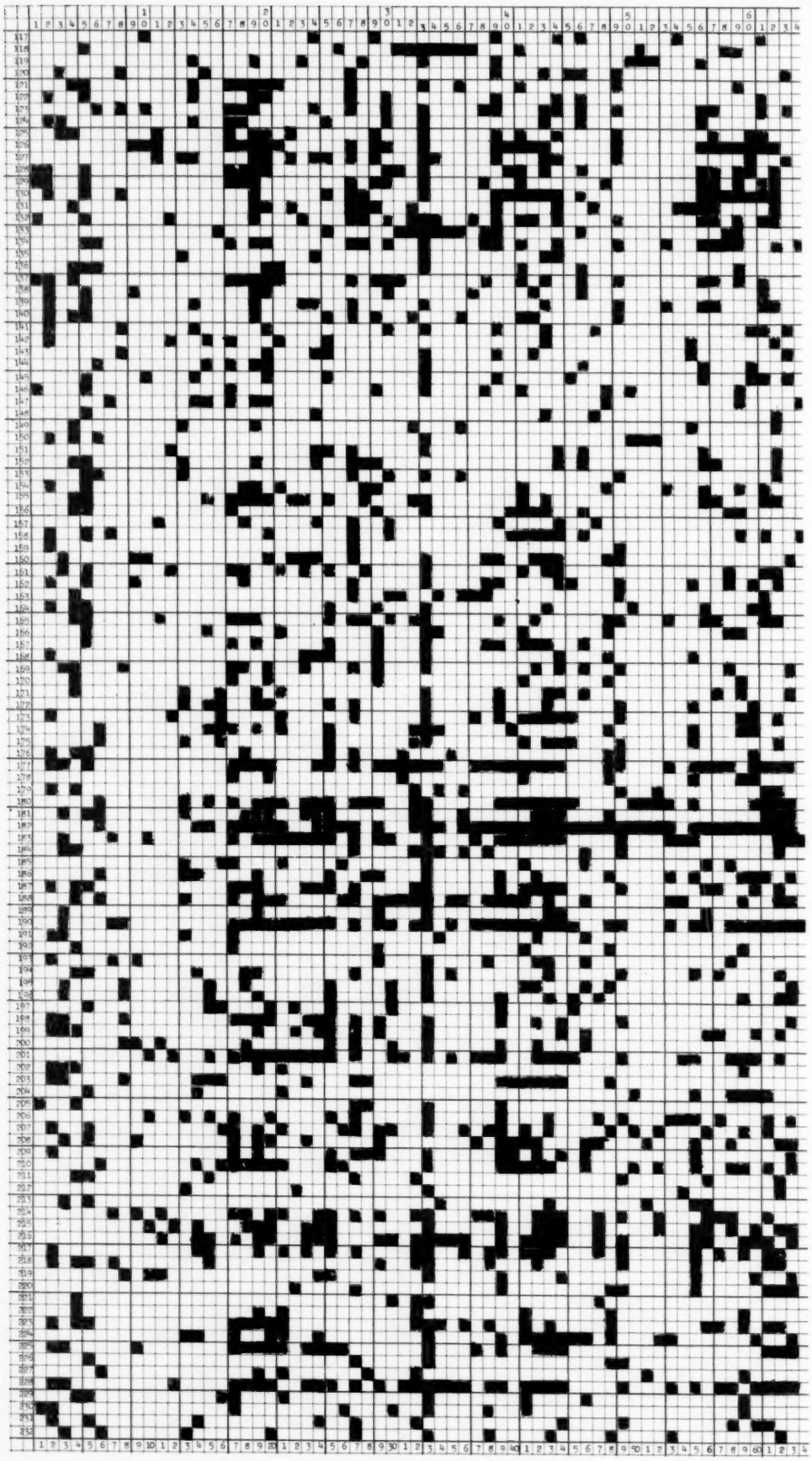
The attention of the readers is called to the "Codex" system devised to supply a coded index to the bibliography in highly compact form. Every item is listed by number, and coded according to its possession of various traits and contents. The items are carried in a chart, whose horizontal axis is numbered according to the analytic code. As a result, one may obtain an alphabetized bibliography on any one of a large number of subjects in relation to social invention simply by reading off the items in the appropriate vertical column. The horizontal code is explained on pages 12 and 13.

The Holidays Are Here!

Spread light and good cheer by giving all your friends and students or even *one* of them a wonderful PRESENT, the AMERICAN BEHAVIORAL SCIENTIST. A card for your convenience is enclosed here. Send it to us and we'll act on your behalf IMMEDIATELY!





CODEX

Code of Analysis Studies Related to Social Invention (Annotated)

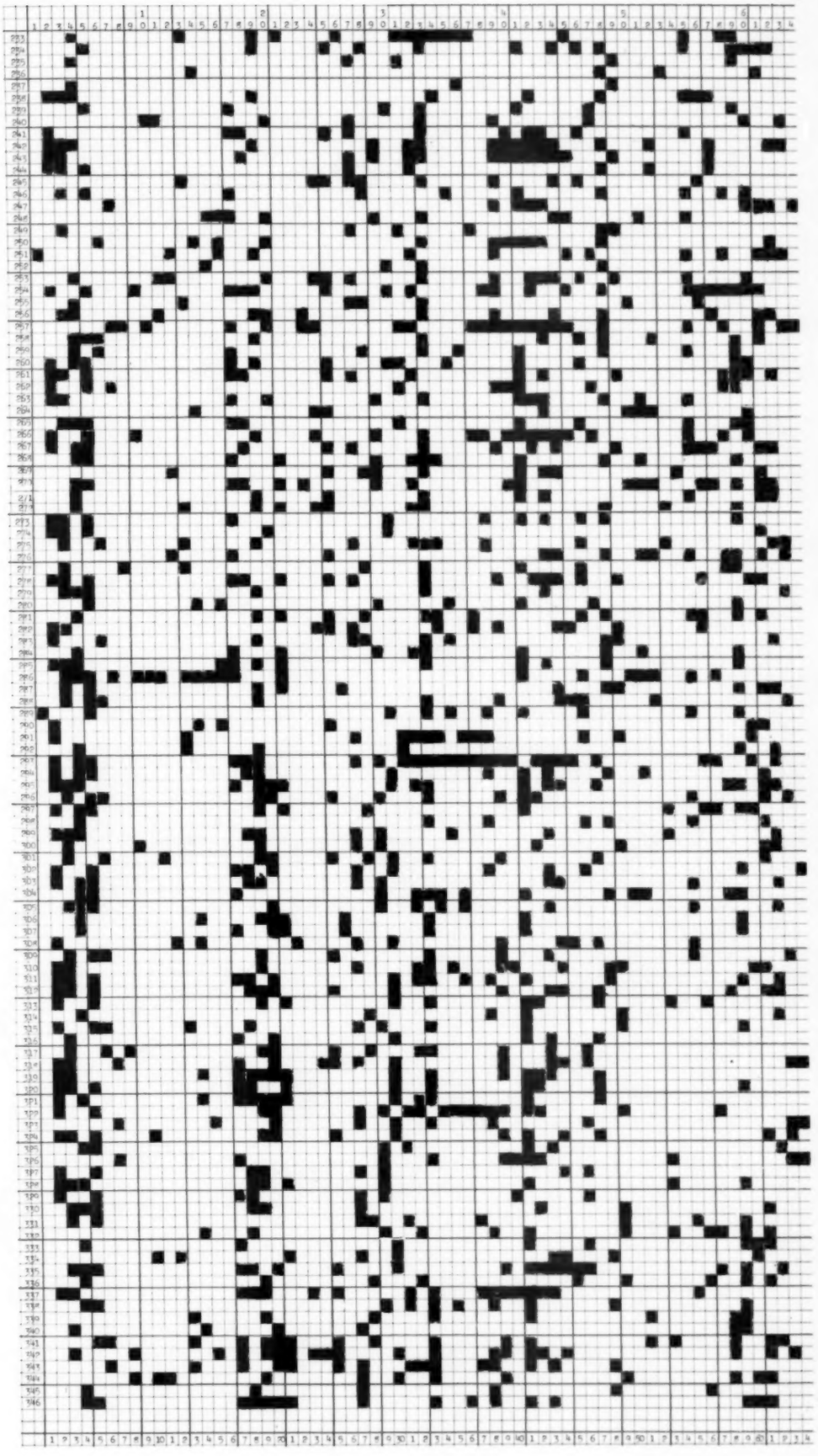
I. More General Categories

1. Definitions, general importance of social invention.
2. Social change; types of human action; human nature and change; factors causing change
3. Purposive change; rationality in change; unforeseen consequences; means and ends; planning change
4. Invention, physical and social; psychology of invention; rights of inventors; comparative rates of growth.
5. Sources of social invention; individuals, institutions such as the marketplace; governments; types of social inventions; myths, doctrines, data - collecting; data - processing; rationalizations
6. Theory and hypothesis in applied social science; social research and action.
7. Utopias; uses and improvements of utopian writing as applied political science.
8. Planned societies, planning for and against invention
9. Invention in community organization; sources of community innovation; diffusion of community practices.
10. Schemes of institutional reform; historical institutions — nature of invention; social movements; reforms
11. Invention in legislation: "positive legislation"; how invention enters the legislative process; origins of bills and rules
12. Invention in work relations: human engineering; the "human relations" movement; consultants and industrial research; diffusion of novel practices
13. Inventiveness in social science methodology; science as the administration of accepted hypotheses; new methods and techniques of research

14. Invention of better ways of inventing: obstacles to social invention; support of social invention; organization and administration of new social forms
15. Ethics of social invention; ideology of social inventiveness; *quis custodes custodet?*; expert vs. layman; social controls over invention
16. The future of social invention: projections; integration of inventors with social system

II. More specific categories

17. Treats human nature heavily
18. Treats unconscious social change
19. Deals directly with social inventions
20. Takes obvious ethical positions or makes recommendations
21. Psychological approach
22. Legal approach
23. Micro-economics approach
24. Macro-economics approach
25. Institutional approach
26. Psychoanalytic approach
27. Historical approach
28. Case study
29 Numerous case studies
30. Largely non empirical
31. Deals with fine art, music
32. Deals with physical sciences
33. Deals with social sciences
34. Deals with biological sciences
35. Deals with writing
36. Deals in mathematics
37. Deals with religion
38. Deals with abstract philosophy
39. Deals with government
40. Deals with family
41. Deals wth individual
42. Deals with communities
43. Deals with large groups, aggregates (large groups, nonorganized)
44. Economic machinery
45. Military forces
46. Method: Highly synthetic
47. Method: Almost non-methodological
48. Method: Deductive logic
49. Method: Chronological historical
50. Method: Questionnaire
51. Method: Interviews
52. Method: Sampling undertaken
53. Method: Content analysis
54. Method: Legal cases comparison
55. Method: Observation (reportorial)
56. Material or findings on rates and changes in innovation
57. Changes in invention
58. Character of leaders
59. Psychology of creativity
60. Institutions of creativity
61. Creativity in institutional settings
63. Specific invention(s)
63. Planning
64. Utopia's (large-scale reform)



Studies Related to Social Invention

1 AARON, Daniel, ed.
America in Crisis, New York, Knopf, 1952. pp 632B.*
Fourteen essays setting the problems of American beliefs and values in the dynamic context of critical historical situations. Each crisis examined involved some degree of social dislocation which forced Americans to reexamine old values and adopt new ones. Defects and virtues of the "American character" are considered, as well as how their values stand up in moments of crisis.

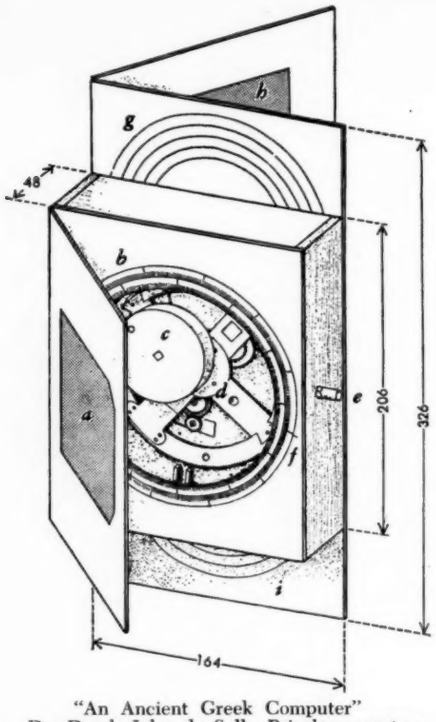
2. ABENDROTH, W. W.
"The Research and Decision Making Process" Chapter III of *Documentation in Action,* New York, Reinhold, 1956, pp 11.
A discussion of operations research in the application of scientific principles to policy problems. This is the result of a greater need of accuracy in decision making. Step by step progression of a problem is given with the associated decision-making stages. The author says that when decision makers can approach this consciously from a scientific viewpoint, decisions will be accurate.

3 ALINSKY, Saul D.
Reveille for Radicals, Chicago, U. of Chicago Press, 1946, pp 228.
Because business, labor and religion have failed to meet the needs of the masses, an awakening of radicals is necessary to build "People's Organizations", to meet those needs. In this attempt to show how man might cope with some of his problems, the author formulates plans and by-laws for these organizations, based on a Chicago experiment.

4 ALPERT, H.
"The Knowledge We Need Most," *Saturday Review,* 1 Feb. 1958. pp 3.
The then Program Director of the National Science Foundation shows that the next area to be opened up to wide research is in the social sciences. He stresses the need for an interdisciplinary approach to the problems of social science.

5 ANDERSON, H. H. ed.
Creativity and its Cultivation. New York Harper, 1959. pp.293.
Essays by Ernest Hilgard, Erich Fromm, Harold D. Lasswell, Rollo May, Margaret Mead, Henry A. Murray and others.

* B = contains useful bibliography.



"An Ancient Greek Computer"
Dr. Derek John de Solla Price's reconstruction of a mechanism found in the remains of a sunken Greek ship near the island of Antikythera, and dated about 82 B.C. It was an astronomical computer that worked on the principle of the modern analog computer. It also is a predecessor of the Arab mechanisms that underlay European clockwork inventions, and shows how far "in principle" the ancients might have gone towards a great many modern inventions. (See the *Scientific American,* June, 1959)

6 ANDERSON, William, and HARRIS, Joseph P.
The Organization and Development of Governmental Research. Minnesota, Social Research Council, 1939. pp 69.
A study of the development and organization of governmental research programs in the United States. A field survey of private and publicly supported agencies, taking stock of their accomplishments and shortcomings.

7 AUBERT, V.
"Change in Social Affairs," *Inquiry,* II, Spring 1959. pp 24.
Distinguishes among random responses precipitated by ignorance, devices rationally used to ensure the existence of chance in social matters, and chance theories. Outlines their functions, *e.g.,* communication with the supernatural, innovation and creativity, representativity, equality and justice.

8 AUBREY, Henry G.
Deliberate Industrialization In Social Research, New York, New School of Social Research, June 1949. pp 24.
A study of deliberate and carefully planned industrialization of a nation, by that nation's government. Considerable favorable illustration is provided (Mexico, Japan, and several European countries).

9 BACHELARD, G.
La formation de l'esprit scientifique. Contribution à une psychanalyse de la connaissance objective. Paris, Vrin, 1947.
Psychoanalysis is useful in studying the obstacles to objective knowledge that are determined by the pressure of psychological needs. The progress of science results from the gradual removal of one psychological cause of distortion after another.

10 BACON, Francis
Advancement of Learning & *The New Atlantis,* London, Oxford Press, 1929 (Orig. date 1627?) pp 275.
In *Advancement of Learning* the author speaks of a logical advancement of learning through the use of inductive reasoning. The *New Atlantis* is a utopia concerned with the study of the creatures and other works of God. These were part of Bacon's contribution to the seventeenth century regeneration of scientific study and interpretation of nature.

11 BAGEHOT, Walter
Physics and Politics, New York, Appleton, 1873.
Through external and internal (implied, for instance, in the tracing of family lines of descent, etc.) improvements, mankind wil continue to improve itself. It is through this inventiveness that the primary distinction between man and other animals is found.

12 BAHRDT, Hans Paull
"The Place of the Technician-Intelligentsia in Society", *American Behavioral Scientist* —Abstract, Jan. 1961. Original Publication: *Frankfurter Hefte,* Germany, April 1960. pp 7.
The "Technician-Intelligentsia" are a group of scientifically educated people, above ordinary technicians, but still frowned upon by intellectuals because of their middle class conformity. A subdued part of the extended middle class, becoming conservative with their newfound power and prosperity.

13 BAILEY, Stephen Kemp.
Congress Makes A Law. Columbia University Press, New York, 1950. pp 282B.

By tracing a single act from formation to becoming the law of the land, the author shows various forces playing a part in the formation of the act, and the formation of the opinions of the Congressmen involved. Theories are presented for strengthening the National Government and improving its efficiency.

14 BAKER, A.
"Elements of Automated Teaching," *American Behavioral Scientist*, IV, 9, May 1961. pp 3.
The values and drawbacks of the new programmed learnings methods. The evidence indicates that, given adequate programming, learning can be faster and better. The methods are still plagued by mechanical bugs, and materials often must be presented in rather uninteresting fashion. Nevertheless, automated teaching has marvellous potential for diffusing the world's pool of fundamental data and information among greater and greater numbers of people.

15 BAKER, Gladys
The County Agent, Chicago, U. of Chicago Press, 1939. pp 225B.
A discussion of the county agent as an administrative and governmental functionary. Organization, history, decline and rebirth of importance of the county agent system are all covered. Also paid some attention to are the specific personnel selections, and particular problems of Negro county agents.

16 BALDWIN, George B., and SHULTZ, George P.
Automation: A new Dimension to Old Problems. Detroit, Michigan, Industrial Relations Research Assoc. 7th Annual Meeting, December 28-30, 1954. pp 36.
New technology and automated production are labelled as a second industrial revolution. Study and careful planning are needed to assist persons to adjust to the flow of materials through this transitory period.

17 BALLANTINE, Duncan S.
U. S. Naval Logistics in the Second World War, Princeton U. Press, Princeton 1947. Index, bibliography.
An attempt at clarification of the relation between economic and military efforts towards perfecting logistics and supply by the U. S. Navy during the Second World War.

18 BANFIELD, Edward C.
Government Project, Glencoe, Illinois, The Free Press, 1951. pp 271B.
A study of the Casa Grande Cooperative Farm Community established by the Resettlement Administration in 1938. A governmental attempt to remake the lives of impoverished farmers and an analysis of the results.

19 BARENNES, Yves
La Modernization Rurale au Maroc, Paris Library Gén. de Courts Justice., 1948.
Governmentally supervised schemes for social and economic modernization of rural areas in Morocco. Planning, implementation and results of twenty-five specific undertakings are considered.

20 BARKER, Ernest
The Development of Public Services in Western Europe, 1660-1930. London, Oxford U. Press, 1944. pp 93.
An historical study of the development and acceptance of administrative and public services in western Europe since 1660. Comparative methods are used in showing the development in different countries.

21 BARLOW, P. G.
"L'anti-utopie moderne," *Esprit*, XXIX, March 1961. pp 16.
Analysis of major themes—absolutism, totalitarianism, pessimism, the death of morality—in the anti-utopian writings of Orwell, Huxley, *et al.*, in comparison with the older utopianism.

22 BARNES, Harry E., *et al.*
The History and Prospects of the Social Sciences. New York, Knopf, 1925. pp 534B.
A series of articles written by experts in their fields presenting the solutions of their fields to various problems. History, development, and the future of History, Human Geography, Biology, Social Psychology, Cultural Anthropology, Sociology, Economics, Political Science, Jurisprudence, and Ethics are considered.

23 BARNETT, H. G.
Innovation, the Basis of Cultural Change. New York, McGraw-Hill, 1953. pp 462.
The goal of this study was to enable generalizations to be made upon innovative behavior and to define the conditions and limitations upon its manifestations. The empirical data for this study was drawn from five ethnic groups and one religious cult.

24 BARNETT, H. G.
"Invention and Cultural Change," *American Anthropologist*, 1947. pp 16.
The author attempts to study the connection between a given form, and the meaning, function, and construction put on it by a particular culture. He holds that only an inventor can dissociate the component elements and envision other combinations of the elements present.

25 BARRON, F.
"The Disposition towards Originality," *J. Abnorm. and Soc. Psychol.*, LI, 1955, pp 7.
Compares the personality organizations of individuals who regularly displayed originality with those who regularly displayed lack of originality. Eight tests were performed on 100 subjects using measurable standards of originality. Results are discussed in the light of psychoanalytic theory concerning the anal phase of development.

26 BARTLETT, F.
Thinking: An Experimental and Social Study. New York, Basic Books, 1958. pp 203.
Regards thinking as a high level of skilled behavior that possesses many of the characteristics of bodily skills. Investigates thinking within closed systems, "adventurous" thinking which breaks out of the closed system, "everyday thinking," and the artist's thinking. Experiments that analyze the performance stages of closed and adventurous thinking are presented, and the author's own thinking on remembering is analyzed for the steps involved.

27 BARLETT, F. C.
"Types of Imagination," *J. Philosophical Studies*, III, 1928. pp 7.
Distinguishes three types of imagination: assimilative, creative interpretation, and constructive imagination. Suggests that the type of imagination favored by an individual is more a matter of temperament than of training and outlines temperament associated with each imagination type.

28 BAUER, Raymond A.
"Our Big Advantage: The Social Sciences," *Harvard Business Review*. Boston, Graduate School of Business Administration, June, 1958. pp 11.
A discussion of the social sciences and their advantages in the United States in contrast with other nations. Particular attention is given to the fact that in other countries, notably the U.S.S.R., the development of new ideas is often hampered by somewhat restrictive ideologies.

29 BEAGLEHOLE, Ernest
"Social and Political Changes in the Cook Islands," *Journal of Pacific Affairs*. Richmond, Va., Institute of Pacific Relations, December 1948. pp 15.
A consideration of planned social, economic, and political changes in the Cook Islands.

30 BECKER, Howard and BARNES, H. E.
Social Thought from Lore to Science, Volume 2. Washington, D.C., Harren Press, 1952. pp 1172B.
A survey of sociological trends throughout the world. A consideration of many of the specific schools of sociology. Also included are a consideration of the growth of sociology as a science and a field of study. Note is also made of the teaching of the subject in many countries.

31 BELLAMY, Edward
Looking Backward, 2000-1887. New York, Random House, 1887. pp 276B.
The author looks backward from the year 2000, and considers social changes from that point. Various inventions, innovations, and idealistic schemes are proposed.

32 BENDA, Julien
The Treason of the Intellectuals, New York, Morrow, 1928. pp 244.
The author considers those who speak to the world in a highly partisan and politically involved manner to be betrayers of society. They have brought about a contemporary humanity whose moral state as revealed by its political life is reduced to class and national passions. They have deserted objective reason.

33 BEN-DAVID, J.
"Roles and Innovations in Medicine," *Amer. J. of Soc.,* LXV, May 1960, pp 11.
Scientific innovators typically have been practitioners involved in research and academic teaching as a sideline, or "role hybrids"; with the spread of professionalization, other fields may gain their innovations from such sources.

34 BERKELEY, Edmund C.
Giant Brains, New York, Wiley, 1949. pp 270B.
A general discussion of mechanical brains (sequence controlled calculators). The author discusses the construction, work, and general theory of mechanics. Also discussed are the social implications of the machines and their possible future uses.

35 BERNARD, L. L.
"Invention and Social Progress," *Journal of Sociology,* July 1923. pp 33.
The thesis of the author is that inventions are of three types: physical, social, and methodological. Sources of invention are both individual and societal. Fields for future invention are also enumerated.

36 BERNARD, L. L.
Social Control in its Sociological Aspects, New York, Macmillan, 1939. pp 705B.
Social control as an independent social science is discussed and contrasted with its role as an applied social science. The author considers its criteria as a social science, and the constructive uses of social control.

37 BEVERIDGE, W. B.
The Art of Scientific Living, Melbourne, U. of Cambridge Press, 1953. pp 176B.
The most important instrument in research is the mind of the researcher. This is therefore an attempt at systematization of knowledge available on mental skills.

38 BLACK, C. E. ed.
The Transformation of Russian Society. Cambridge, Harvard U. Press, 1960.
Papers from a 1958 conference: changes in law, politics, education, scholarship, religion, family, youth, human welfare, personal and social values, etc., since 1861—the beginning of the era of social reforms.

39 BLOOM, Gordon F.
"A Note on Hicks's Theory of Invention," *Amer. Economic Rev.* Evanston, Illinois, March 1946. pp 13.
A consideration of the four types of invention as theorized by Hicks. Also a commentary on labor and an argument that it will be beneficial for labor to accept technological progress in the long run.

40 BLOOMBERG, Warner, Jr.
The Age of Automation, New York, League for Industrial Democracy Inc., 1955. pp 89.
An attempt to trace the relationship of the industrial revolutions and the later automation to social changes. A discussion of the consequent necessary adjustments to be made by institutions and individuals.

41 BOAS, Franz.
"Invention," in *General Anthropology,* Boston, Heath, 1938. pp 43B, index.
A consideration of innovations and inventions among the more primitive peoples of the world. In even the simplest of societies, the imagination and creativity of man may be seen.

42 BOAS, Franz.
The Mind of Primitive Man, New York, *Macmillan,* 1911. pp 285B.
In a relativistic approach to the study of primitive man, the author develops a thesis showing that a relation between physical characteristics and cultural characteristics need not be necessary.

43 BOBBIT, J. C.
"Proposal for a Management Idea Pool," *Personnel Administration,* XXII, Nov.-Dec. 1959. pp 3.
The problem considered is how to get people to put forth creative suggestions. The conclusions reached primarily centered around a cash award for each idea used. Such a system would also have value for storage of ideas.

44 BOOTH, Andrew D.
"Translating Machines," *International Social Science Bulletin,* X, 1, 1958. pp 8.
A pamphlet outlining the problems and uses of translating machines. These machines would be of great use to the United Nations and other organizations with similar language problems.

45 BOULDING, Kenneth E.
The Organizational Revolution, with a commentary by Reinhold Niebuhr. New York, Harper, 1953. pp 286.
A study of the organization of large corporations and the changes necessitated by their great size. Also considered are the impact of these organizations on moral, social, and political institutions.

46 BRADY, Robert A.
Business As A System of Power, New York, Columbia P. Press, 1943. pp 340B.
A negative description of the efforts of industries to organize for political action in the twentieth century in several countries.

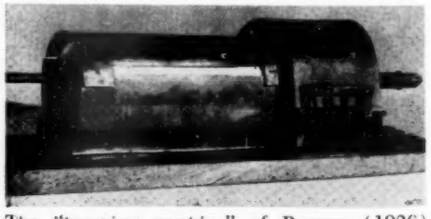
47 BRECHT, Arnold.
"Constitutions and Leadership," New York, New School for Social Research, 1934. pp 21.
The thesis of the author is that written constitutions do not leave room for dynamic leadership by strong personalities. He generously illustrates the point with various constitutions.

48 BRITT, S. H.
"Psychology and the War," *Psychological Bulletin,* XXXIX, 1942. pp 13B.
A treatise concerning some unique psychological aspects of the war. This is concerned with the methods used to meet these situations, and includes data on the results.

49 BROWN, Harrison, BONNER, J., and WEIR, J.
The Next Hundred Years, New York, Viking Press, 1957. pp 193B.
An attempt at the forecasting of the future through the extrapolation of present events and trends. Only the future will tell completely, but through careful deduction, we can hope to make some valid predictions.

50 BUNBURY, Sir H.
Governmental Planning Machinery. Chicago, Public Administration Service #63, 1938. pp 25.
A study of the several organizations within the government responsible for the planning and organization of the various facets of state, local, and national governments; and a consideration of coordination and interaction between them.

51 BURLINGAME, Roger
Engines of Democracy, New York, Scribner, 1940. pp 606B.
A discussion of social invention through an historical approach. The author analyzes our changing times and growing culture and discusses social inventions in light of this.



The "teacning machine" of Pressey (1926) was the forerunner of many current devices and of programmed teaching materials. This was a multiple-choice machine that permitted a student to progress only when he gave the correct answers.

52 BURNS, C. Delisle.
Political Ideals. London, Oxford U. Press, 1932. pp 358.
The author follows the ideals of man such as "liberty" as they have developed over the centuries. Social inventions should be studied as mechanical inventions have been.

53 BURY, J. B.
The Idea of Progress, New York, Macmillan, 1932. pp 357.
The author writes of the ideas that "rile the world" and the part these ideas have in the innovation and changes wrought by man. The analysis is historical.

54 BUSSI, Emilio
Evoluzione Storica dei Tipi di Stato, Cagliari, Italy, Editrice Sarda, 1954. pp 294.
A consideration of the evolution of various types of state. The factors going into the making of the various types as well as primary features of each type of state are discussed.

55 CALDWELL, Robert G.
"Exile as an Institution," *Political Science Quarterly,* June 1943 pp23.
Because of its political importance, particularly in Latin America, the author feels that exile may be treated as in institution. Historical backgrounds as well as present times are considered. The "right of asylum" is also considered as voluntary exile.

56 CAMPANELLA, Tomaso.
"City of the Sun, in *Famous Utopias.* New York, Tudor Press, 1942 (original publication 1623) pp 42.
An attempt at a social utopia. One of the first formulations of a completely socialistic system based on lofty idealistic principles and a basic scientific system of mathematical nature. Attention is given to the problem of providing full employment.

57 CAMPBELL, Angus
"The Uses of Interview Surveys in Federal Administration," *Psy. Study of Social Issues,* May 1946. pp 8.
A description of the growing use and importance of interview surveys in Federal administration. These lead to an extension of fact-finding services, and are important in assessing public opinion. Because of these factors, these are of growing importance in decision making.

58 CANNON, W. B.
"The Role of Chance in Discovery," *Scientific Monthly,* L. 1949. pp 5.
Discusses the nature of serendipity, provides numerous illustrations of its operation in the work of scientists, and comments on the conditions necessary for its occurrence. The observer must be prepared through knowledge and an open mind to take advantage of chance observations.

59 CARTWRIGHT, Dorwin.
"Social Psychology in the U. S. Army During WW II" *Human Rel.* 1, 3, 1947-48. pp 19B.
A consideration of the growth and changes in social psychology from 1939-1947, with special emphasis on the applicability of the subject to military uses. Various developments are traced carefully as illustrations of the points made.

60 CAZENEUVE, J.
"Technical Methods in the Prehistoric Age." *Diogenes,* 27, Fall 1959. pp 23.
As evidenced by inventions, science and its laws were obscurely known to early man, and were not necessarily connected with magic or religion.

61 CHAMBERLAIN, Alexander.
"The Mythology and Folklore of Invention," *J. of American Folklore,* X, June, 1897. pp 11.
An account of the folklore of invention among primitive peoples.

62 CHAMBERLAIN, Alexander.
"New Religions Among the North American Indians," *J. of Religious Psychology,* Jan. 1913. pp 49B.
A survey of "new religions" of the North American Indians and primitive peoples. A "new religion" is one which springs up after contact with "higher" races, or their missionaries.

63 CHAMBERLAIN, Lawrence.
The President, Congress, and Legislation, New York Col. U Press. 1946.
An inquiry into who initiates specific legislation, considering the period from 1870-1940, and dealing with the source of ideas in the President, Congress, and pressure groups.

64 CHAMBERLAIN, W.
An International Institute for Scientific Information. International Conf. of Sci. Info. Washington, 1958. pp 11.
The future of mankind lies with scientists. We should have some sort of international pool of information for use by scientists of all nations.

65 CHANDLER, T.
"Duplicate Inventions?" *Amer. Anthropologist,* LXII, June 1960, pp 3
True "duplicate invention" is much rarer than sometimes supposed, most cited examples overlooking connections between inventors; "each major innovation comes from one man."

66 CHAPIN, S. F.
Cultural Change. Dubuque, Iowa, Little, Brown, 1928. pp 448.
A study of the cultural phenomenon of change and its psychological and sociological aspects. Many cases of specific inventions are considered, including social inventions.

67 CHASE, Stuart.
The Proper Study of Mankind, New York Harpers, 1948.
The author is concerned with the new methodology of the various social sciences, and the varied uses of these methods. Attention is also given to the interconnections between the social sciences.

68 CHASE, Stuart.
Roads to Agreement, New York, Harpers, 1951, pp 250B.
A further development of *the Proper Study of Mankind.* A study of agreement and conflict in an integral society, with emphasis upon semantics in human relations.

69 CHILDS, Harwood L., and WHITTIER, John B.
Propaganda by Short Wave, Princeton, Princeton U. Press, 1942. pp 355.
The importance of the innovation of the dissemination of propaganda through the medium of radio is discussed. The effects, importance, and possible future of the process are discussed.

70 CLARK, G. N.
Science and Social Welfare in the Age of Newton. London, Oxford U. Press, 1949. pp 159.
A discussion of the application of science to industry, and the evils, both economic and social, arising with the growth of the new technology.

71 CLARKE, Maude V.
Medieval Representation and Consent, London, Longmans, & Green, 1936. pp 408.
A study of the origin, growth, and development of representation, and representative institutions, particularly in Great Britain. Major consideration is given to the concept of consent.

72 COLLIER, John & Mary
"An Experiment in Anthropology," *Scientific American,* January 1957, pp 9.
The authors deal with an impoverished community in the mountains of Peru, and the extensive social and economic planning through which these people raised their standard of living.

73 COMPTON, Arthur H.
Atomic Quest, New York, Oxford Press, 1956. pp 370.
A treatise concerning atomic energy and the social changes it has necessitated. Both peacetime and wartime uses are considered.

74 CONKIN, Paul K.
Tomorrow A New World: The New Deal Community Problem, Ithaca, New York. Cornell U. Press, 1959. pp 350B.

A consideration of seven of the New Deal communities of the mid-thirties. A discussion of the value and problems of an extensively planned community.

75 CORNWELL, E. E.
"The Presidential Press Conference: A Study in Internalization," *Midwest J. of Pol. Science,* IV, November 1960. pp 20
In 20 years the conference has changed from a highly informal semi-private encounter into a formalized public institution; the President now speaks more directly to the public through it, but has perhaps lost some of the "subtle benefits" gained from intimate contact with reporters.

76 CURCIO, Carlo
Utopisti e Riformatori Sociali del Cinquecento, Bologna, Italy, E. Zanichelli, 1941. pp 212.
A consideration of several of early utopias of the 16th century. Discussion of their theory, and of the social reforms they promised.

77 DALE, E.
The Great Organizers. New York, McGraw-Hill, 1960.
Profiles of managers who solved organizational problems of DuPont, GM, Westinghouse, National Steel, describing the methods they used, comparing management theories, pointing out fallacies.

78 DAVIS, Morris.
"Community Attitudes Towards Fluoridation," *Public Opinion Quarterly,* 1959-1960. pp 9.
A consideration of community attitudes on the new technique of fluoridation of public water for prevention of tooth decay. Discusses how far the public can be safely brought into political discussions and decision making on issues such at this.

79 De GRAZIA, Alfred
"Fact and Value in Teaching," *PROD,* III, 5 Jan. 1960. pp 5.
With a summary of the procedure of courses in American government as an illustration, the author proceeds to analyze the problem of objective and moral values in teaching.

80 De GRAZIA, Alfred
"The Hatred of New Social Science," *American Behavioral Scientist,* V, 2, Oct. 1961, pp 9.
Takes up and answers claims against the abuses, impossibility, and insufficiency of social sciences. A typology of "misocioscientists" is presented, and the role of social science sketched.

81 De GRAZIA, Alfred
"Mathematical Derivation of an Election System," *Isis.*
One of the essential elements in the series of inventions ending in proportional representation is traced to its beginnings and placed in its Enlightenment context.

83 De GRAZIA, lfred
Public and Republic. New York, Knopf, 1951. pp 262B.
Discussion and analysis of clusters of ideas about representative systems and elections, chronologically treated, from British and American experience, from 15th century onwards. The connections between ideology, invention, and advocacy of electoral devices and doctrines are traced in numerous cases.

83 DeGRAZIA, Alfred
"Social Invention in the Age of Controls," *Amer. Behav. Scientist,* October 1960. pp 3.
Defines invention and argues that all invention is social. We are not in control of the inventive process but an age of social control is approaching in which inventiveness is a key problem.

84 De GRAZIA, Sebastian
Errors of Psychotherapy, New York, Doubleday, 1953, pp 288.
Ranges far and wide in search for precedents, analogies, and homologues of current systems of psychotherapy, viewing all types as presenting patients with authorities of one kind or another, whether overtly or in disguise.

85 De MAN, Henry.
The Psychology of Socialism, New York, Holt, 1927. pp 509.
This document examines the problems of democratic socialism from the viewpoints of causes, aims, movement, and doctrine. The author's credo is also a formulation for achieving a better life in an ever-changing state.

86 DEWEY, John
Human Nature and Conduct, New York, Modern Library, 1950. pp 336.
The nature of habit, whose understanding is the key to social psychology.

87 DORFMAN, Joseph
"Fulton and the Economics of Invention," *Political Science Q,* Dec. 1944. pp 15.
This is a consideration of the economic facets, and the motivation, economic as well as otherwise, behind a very important physical invention. It also deals with how men coped with the invention and ensuing problems.

88 EELS, K., DAVIS, A., HAVIGHURST, R. J., HERRICK, V., and TYLER, R.
Intelligence and Cultural Differences, Chicago, U. of Chicago Press, 1951. pp 371B.
A study of I. Q. as related to cultural background. The book also includes a consideration of various tests and their effectiveness.

"True ordinary guillotine: a fine prop for liberty," from Ernest F. Henderson, *Symbol and Satire in the French Revolution,* New York, G. P. Putnam's Sons, 1912, page 275, plate 119.

89 ENGELS, Fredrick.
Socialism: Utopian and Scientific, New York, International Publishing Co. 1935. pp 96.
An introduction to the principles of scientific socialism. The treatise includes a sketch of the history of the development of socialism, and its ideas from various philosophies.

90 "Ergonomics: The Scientific Approach to Making Work Human." *Intl. Labour R.,* LXXXII, Jan. 1961, pp 35.
The historical development of "ergonomics," or human engineering as it is known in the United States; the contributions of anthropometry, physiology, and psychology; and practical applications in industry from the economic and humanitarian points of view.

91 ERNST, Morris.
Utopia 1976, New York, Rinehart, 1955. pp 305.
A utopian study which draws upon present day materials for the most part, and through the use of interpolation, attempts to describe future American society.

92 FERRI, Enrico
Socialism and Modern Science, N. Y., International Library, 1900, pp 213B.
An attempt to show that experimental science is in complete harmony with contemporary socialism (communism) and not at all counter to the ideals of it. The theories of Marx and Engels are compared to and reconciled with Darwinism. Communism is concluded to be the most fruitful way of life.

93 FINE, S.
Laissez-Faire and the General Welfare State. Ann Arbor, U. of Michigan Press, 1956, pp 486B.
The historical development of the "laissez-faire" government, versus the general-welfare" state is considered from early American times to the present. The book concludes with a discussion of the "general-welfare" state of the 20th century.

94 FISHER, Ronald A.
The Design of Experiments, London, Oliver and Boyd, 1949. pp 240.
Although specifically designed to give the readers the principles of, and statistical procedures in, sound experimentation, this book is useful as a consideration of the mode of innovation and invention in an institutional setting.

95 FRANK, Lawrence K.,
"Psychology and Social Order," from Daniel Lerner, ed., *The Human Meaning of the Social Sciences,* New York, Meridian Books, 1959. pp 27.
The essentially psychological concept of a man-made social order which embraces all of man's behavior is considered. Only through education and persuasion can a self-regulating and self-repairing social order be created out of a "multi-modal" culture.

96 FREUD, Sigmund
The Basic Writings of Sigmund Freud. New York, Random House, 1938. pp 1001.
A number of key writings are presented in which invention and creativity are seen as the result of the dynamic interplay between the id and the ego.

97 FRIEDMANN, J.
"Intellectuals in Developing Societies," *Kyklos,* XIII, 4, 1960. pp 32.
Though research on numerous specific topics is needed, data from many societies demonstrate that the modern intellectual "must be ranged alongside the innovator in affairs of business as a principal agent in precipitating economic growth . . .; he mediates new values, he formulates an effective ideology, and he creates an adequate collective self-image."

98 FRIEDRICH, Carl J.
"What Is Meant by Politically Impossible?" *PROD.* May 1958. pp 4.
The question of political change is reformulated logically and philosophically. The range of the scientifically demonstrable "political impossibility" is very limited when dogmatic views of human nature are discarded.

99 GASTIL, Raymond D.
"Middle Class Impediments to Iranian Modernization." *Public Opinion Q.* 1958. pp 5B.
Modern social systems depend on elements of trust and cooperation which the author finds lacking in the Iranian middle class.

100 GEREMIA, G.
"Storia dell 'Assicurazione Contro la Disoccupazione," in *Economia & Storia,"* Milan 1960. pp 23.
A detailed study of the development of unemployment insurance in Italy is offered. Analysis of similar programs in other countries is presented, with recommendations for their improvement.

101 GHISELIN, B.
Creative Process. Berkeley, U. of Cal. Press, 1954. pp 259.
An understanding of the creative process will increase the efficiency of development in any field. Light is thrown on this process by selected discussions of invention.

102 GIBB, C.
"Creative Personality," *Australian J. of Pol. and Hist.,* VII, 1, May 1961. pp 19.
A clear definition of creativity followed by some trenchant paragraphs on the subject of the unconscious, preparation, incubation, illumination, the characteristics of creative pehsonality, the meaning of IQ credulity, independence, tolerance of ambiguity, originality, drive, credulity, independence, tolerance of ambiguity, originalty, drive. Leisure, environmental stimulation, support and the cultural matrix are necessary. The interaction effects in creativity are reminiscent of those of leadership. "Creativity represents a delicate and sensitive balance between a thorough grasp of knowledge known to date and a refusal to be bound by what is accepted as known." Universities are too involved with administration, internal politics, and salaries to provide an appropriate atmosphere for innovation.

103 GILFILLAN, S. C.
The Sociology of Invention, Federalsburg, Md., Stowell, 1935. pp 190B.
This work is one of the first efforts to create a general theory of social and physical invention. The social causes as well as the social repercussions of technical inventions are discussed.

104 GILL, Norman N.
"Permanent Advisory Committees in the Federal Government," *J. Politics,* 1940, pp 26B.
The history, growth and function of advisory committees in Federal Government is described. Analysis of disciplines represented on these panels is offered.

105 GINZBERG, E. and E. W. REILLEY
Effecting Change in Large Organizations. New York, Col. U. Press, 1957. pp 150B.
Discusses developing methods of organizational change through utilization of knowledge existing in the field rather than intuition.

106 GIOVACCHINI, D. L.
"On Scientific Creativity," *J. of Amer. Psychoanalytic Assoc.,* VIII, July 1960. pp 19.
A study of eight highly creative physical scientists. For example, "If they became too enmeshed in ritualistic systems, strong reaction formations, or intellectualizing, they found they could not create"; "During creative phases they were aware of chaos and disorder and it became a scientific task to extract order from it." Concludes that "The creative operations of the ego . . . consist of a balance of primary and secondary process. This ego has the ability to find the chaotic impulses emerging from the unconscious, fuse them with external reality, and refine and integrate the product. When this was achieved, a new segment was added to reality."

107 GLASS, D. V.
"The Application of Social Research," *British J. of Sociol.,* March 1950, pp 14.
Social research is necessary in the formulation and implementation of government policy and should be provided for within the structure of government.

108 GLASS, H. B.
"Maupertius, A Forgotten Genius," *Scientific American,* Oct. 1955. pp 11.
Discusses the work of a 17th century scientist who was the first to apply the laws of probability to the study of heredity, enabling him to foresee the theories of genes, mutations and evolution in astonishing detail.

109 GLAZIER, W.
"Automation and Labour," *Monthly Review,* Aug. 1958. pp 10.
Planning is necessary to meet problems of dislocation of labor resulting from technological change. Education integrating society with its technological environment is called for.

110 GLUCKMAN, M.
"Malinowski's Functional Analysis of Social Change," *J. International African Institute,* 1947. pp 22.

Malinowski's concept of culture change is criticized as too narrow due to his sacrifice of a comparative evaluation to particularity, and is hence mere description. His theory is "sterile and leads to naive oversimplification."

111 GORER, G.
"The Inventions of Man," *Twentieth Century,* CLXIII, Dec. 1960. pp 7.
There have been no basic social inventions "beyond the subdivisions of the sovereign state" in the past 2,000 years yet now more than ever there is need for organized social invention, especially because the state has become extremely dangerous.

112 GOSNELL, H. F.
"British Royal Commissions of Inquiry," *Pol. Sci. Q.,* 1934. pp 33.
Partisan rivalry between the U. S. executive and legislative branches in policy formulation could be reduced by following the example of British advisory commissions of investigation. The record of these commissions during the 1920's is reviewed.

113 GOSNELL, H. F.
"A List System with Single Candidate Preference," *Am. Pol. Sci. Rev.,* 1939. pp 5.
A modification of the Hare system of proportional representation designed to cut down time and expense of operations is formulated.

114 GOSNELL, H. F. & DAVID, M. C.
"Public Opinion Research in Government," *Am. Pol. Sci. Rev.* 1949. pp 9.
Reviews briefly public opinion research projects undertaken by U. S. government agencies during wartime. Such research is viewed as an established tool in policy making though its use could and should be made more effective.

115 GOUGH, J. W. *The Social Contract.* Oxford, Clarendon Press, 1956. pp 231.
This work examines historically and critically the development of the social contract theory which is seen as valuable in giving a rational basis to traditional liberalism but weak in proposing 'obligatory' normative ideals universally applicable or binding.

116 GOULDNER, Alvin W.
"Theoretical Requirements of the Applied Social Science," *Am. Sociol. Rev.,* Feb. 1957. pp 10.
Applied social science can gain much by recognizing a continuity with the work of earlier sociologists. The true office of the theorist is best performed when he exposes old theories to current empirical tasks.

117 GRAY, Horace M.
"The Passing of the Public Utility Concept," *J. Land & Public Utility,* Feb. 1940. pp 20.
The traditional concept of social utility is no longer valid and is a strong retarding influence to social change due to its deep roots in English law and custom.

118 GREENACRE, P.
"Woman as Artist," *Psychoanalytic Q.,* XXIX, April 1960. pp 19.
In general, fewer women than men have substantial artistic or scientific creative talent; there are a number of early genetic factors "which may restrict the female's later development of adequate capacity for externalization of artistic creativity."

119 GRILICHES, Z.
"Research Costs and Social Returns: Hybrid Corn and Related Innovations," *J. of Pol. Economy,* LXVI, Oct. 1958. pp 13.
Analysis of one successful venture suggests a very high rate of return on public research investments; the point is that some sort of cost-and-returns evaluation is possible.

120 GYORGY, A.
Geopolitics—The New German Science. Los Angeles, U. of Calif. Press, 1944. pp 299B.
The development of the idea of geopolitics is traced and its value assessed. The concept is a valid approach but was corrupted by its identification with German National Socialism.

121 HADAMARD, J.
The Psychology of Invention in the Mathematical Field. Princeton, Princeton U. Press, 1945. pp 143.
Invention is defined as discernment or choice and consists of four stages: preparation, incubation, illumination and verification. Writings on psychology of invention and mathematical inventions are presented.

122 HAGEN, E. E.
"How Economc Growth Begins: A General Theory Applied to Japan," *Public Opinion Q.,* 1958. pp. 18.
The beginnings of economic growth should be related to general social change rather than to any key factor. For widespread economic growth a society which produces innovators is necessary.

123 HALÉVY, E.
The Growth of Philosophic Radicalism. London, Faber & Faber, 1928. pp 554B.
A study of 19th century English social philosophic thought and its roots in previous French writing. Traces idea of applying to social sciences the principles and methods of physical sciences.

124 HALMOS, P.
"Social Science and Social Change," *Ethics,* Jan. 1959. pp 15B.
The dissemination of information derived from the social sciences has a direct casual relation to social change.

125 HAMILTON, W. and TILL, I.
"What is a Patent?" *Law and Contemp. Problems,* XIII, 2.
Patents are currently being misused as a result of the fallacious assumptions on which the patent system rests. It is not possible to determine where a single invention begins or ends.

126 HANKE, L.
The First Social Experiments in America. Cambridge, Harvard U. Press, 1935. pp 99B.
Considers the sixteenth century policy of the Spaniard toward the American Indians as comparable in spirit to the work of modern sociology.

127 HARDIN, C. M.
Political Influence and Agricultural Research. Menasha, Wis. 1947. pp 18B.
Discusses how to organize procedure so that scientific inquiry is effectively pointed at major problems of agricultural production and marketing. The analysis suggests special insights of groups differently situated with respect to a complex problem might be marshalled in deriving research concepts.

Drawing lots for the militia of Lilles, 1688. The feudal lord could require military service, a precedent for nationalistic universal conscription and the selection of American draftees by lot in 1940.

128 HARRISON, H. S.
"Inventions: Obtrusive, Directional, and Independent," *Man.* 1926. pp 5.
Management will soon have at its disposal the tools for anticipating the effects of policies, organizational forms and investment choices. An analysis of probable use of these tools and concepts on which they are based is offered.

129 HARRISON, H. S.
"Opportunism and Factors of Invention," *Am. Anthrop.* 32, 1930. pp. 20.
Inventions develop by an accumulation of small modifications. Modifications is defined and analyzed as an aid in comprehending the inventive process.

130 HASKINS, G. L.
Law and Authority in Early Massachusetts: A Study in Tradition and Design. New York: Macmilan, 1960. pp 298.

Their institutions were not primitive responses to new situations or yet the outcome of a doctrinaire adherence to preconceived plans. When they innovated, they did it deliberately, with full awareness of the novelty of what they were doing.

131 HATFORD, H. S.
The Inventor and his World. London, Penguin, 1948. pp 256B.
The climate of Britain up to 1880 was favorable to invention, but became less so as control passed to financiers. There is a direct relation between social and legal conditions, and rate of invention.

132 HEIZER, R. F.
"A Pacific Eskimo Invention in Whale Hunting in Historic Times," *Am. Anthrop.* 45, 1943. pp 5B.
A theory of "technological reapplication" is used to explain a particular Eskimo invention which the author traces.

133 HERRING, P.
"On Science and the Polity," *SSRC Items,* XV, March 1961. pp 6.
A critique of the C. P. Snow thesis that scientists and intellectuals have had negligible policy roles. "Science has become another of the great interest groups and in a free society has assumed a prominent place in the polity."

134 HERTZLER, J. O.
The History of Utopian Thought, New York, Macmillan, 1926. pp 321B.
A study of the major utopias as concepts of social improvement. Social ideals are analyzed with regard to environment in which produced.

135 HICKS, J. R.
"Linear Theory," *Econ. J.,* LXX, Dec. 1960. pp 39.
Surveys in detail the considerable extent to which the new techniques of economics —linear programming, activity analysis, input-output, and game theory—have reduced economics to pure mathematics; as a *social* science, however, economics cannot be reduced to pure technics.

136 HILGARD, E. R.
"Creativity and Problem Solving," in *Creativity and its Cultivation.* New York Harper, 1959. pp 18.
Concern with how to encourage creativity and a problem-solving approach in every person of average talent. Summarizes some of the psychological research in the problem-solving area and emphasizes, as a favorable circumstance for problem-solving, the meaningful nature of the problem and the more lasting effects of understanding, as compared with the rote memorizing of material.

137 HIRN, Y.
The Origins of Art. London, Macmillan, 1900. pp 327B.
Psychological and sociological origins of art are elucidated. Art is found to be those concrete manifestations of the creator which heighten pleasure and relieve pain. The art-impulse, the emotions, social expression, and art and magic are among the areas treated.

138 HOCART, A. M.
Kingship. London, Oxford U. Press, 1927. pp 243.
Combines anthropological analysis and speculation to trace various theories of kingship to a common source. Originality and individuality are viewed as secondary to collective contribution to social invention.

139 HODGEN, M. T.
Change and History. New York, Wenner-Gren Foundation, 1952. pp 324B.
A historical study of technological change in England focussing upon the distribution of technological innovations. Innovation is conditioned primarily by the social rather than the technological environment.

140 HOGBEN, L.
Mathematics for the Million. New York, WW. Norton, 1937. pp 647.
The author traces the development of mathematical practices from the most primitive to modern statistics, the 'arithmetic of human welfare.' The level of mathematical development is a reflection of the cultural level of a civilization.

141 HOLCOMBE, A. N.
Government in a Planned Society, New York, Norton, 1935. pp 173.
Social invention should be on a par with technological progress. A need for more planning and an experimental attitude in Govt. administration is recognized.

142 HOOS, I. R.
"When the Computer Takes Over the Office," *Harvard Bus. R.,* XXXVII, July-August 1960. pp 10.
Electronic data processing (EDP) is increasingly widespread, but some theories of its supposed effects are not borne out. Personnel upgrading has not occurred; rather, there is a "stratum of equally dull, repetitive, low-paid jobs—and only enough of them for considerably fewer workers. In fact, a number of classifications that were on the upper levels of the office roster are disappearing as automation takes over." There is also a trend toward "recentralization." The EDP elite is largely autonomous within the organization and its members pre-empt some industrial relations functions "yet ignore the turmoil brought into these peoples' lives."

143 HOOVER, R. C.
"On Master Plans and Constitutions," *J. of Amer. Inst. of Planners,* XXVI, Feb. 1960. pp 20.
Sociophysical urban growth must be comprehensively planned in terms of "end directions"; these directions or goals themselves must be carefully formulated in a process precisely specified by the author.

144 HUNT, T. C.
"Behavioral Science For Whom?" *American Behavioral Scientist,* V, 3, Nov. 1961. pp 4.
The current exploiters of behavioral science grow rich and pile up great-slag heaps of human problems. We must reorganize the mining process. Several philosophers and psychologists have established an objective basis for regarding autonomous, creative personality as the aim of applied behavioral science.

145 HUTCHINSON, C. E.
"An Institute for National Security Affairs," *American Behavioral Scientist,* IV, 1, September 1960. pp 5.
In spite of prodigious inventiveness and massive expenditures for national security, the United States has not conducted coherent research on the policy of security. A unified government program for fundamental and applied research in the field of national security would do much to unify practices and to eliminate gaps in the communications between one security operation and another.

146 HUTCHINSON, E. D.
How to Think Creatively. New York, Abingdon-Cokesbury, 1949. pp 237.
Concerned with "an exposition of the processes of creative thought" as obtained from an analysis of letters, comments, interviews and questionaires of 250 modern creative thinkers. Differentiates between sytematic thinking and insight which are the extremes of a scale with the varying factor being "the degree of psychic frustration." Isolates 4 essential stages in creative insight.

147 HUXLEY, A.
Brave New World. New York, Harper & Bros., 1932. pp 311.
This satire of an industrial utopia is concerned with the advancement of science as it affects human values.

148 INGERSOLL, E.
"Wampum and its History," *Am. Nationalist,* 1883. pp 20.
The author surveys the kinds and uses of wampum among a number of North American Indian tribes. Its use as money is considered as evidence of an 'advanced' culture.

149 INTERNATIONAL CONF. ON INFORMATION PROCESSING "Abstracts," *Behavioral Science* IV, 4, Oct. 1959. pp 10.

Abstracts of papers on technical aspects of: universal machine language; use of computers for translation; machines for line pattern, character and numerical recognition and other areas of machine use in thinking, learning and recall.

150 JAHODA, M., DEUTSCH, M. and COOK, S.

Research Methods in Social Relations. New York, Dayden Press, pp 726 2 vols. B.

This is an introductory text on research methods. Volume I is concerned with basic process; volume II with selected techniques. Presents detailed explanation of various data collection techniques.

151 JENKS, L. H.

"Early Phases of the Management Movement," *Admin. Sci. Q.*, V, Dec. 1960. pp 27.

The convergence of distinct movements, such as Taylorism, led to the emergence of collective standards for the solution of management problems in particular types of industry, thence to the contemporary institutionalization of business management.

152 JEWKES, J., SAIVERS, D., and STILLERMAN, R.

The Sources of Invention. London, Macmillan, 1958. pp 410.

Causes and consequences of industrial innovation are the focus of this work. Technical inventions are not solely scientific in origin. Inadequate knowledge about innovation prevents the formulation of general theories at present.

153 JOHNSON, P. O.

"Development of the Sample Survey as a Scientific Methodology," *J. Experimental Ed.*, vol. 29, March 1959.

Surveys the development, use and methodology of the sample survey.

154 KAEMPFFERT, W. B.

Invention and Society. Chicago, Am. Lib. Assoc., 1930. pp 37.

Social and economic tensions are determining factors in both the timing and utilization of inventions.

155 KAHN, A.

"Fundamental Deficiencies of the American Patent Law," *Am. Eco. Rev.*, Sept. 1940. pp 16.

Inventions are the result of a cooperative process and a societal evolution which are not sufficiently recognized by the American patent system. Patents often retard technological innovations for this reason.

156 KARDNER, A. and PREBLE, E. eds. *They Studied Man.* New York, World, 1961. pp 287.

The major hynotheses of some great anthropological innovators related to the ethos of the time and their personal lives: Darwin, Spencer, Tylor, Frazer, Durkheim, Boas, Malinowski, Kroeber, Benedict and Freud, with an extra plea for the use of Freudian and other psychology in the study of social change and institutions.

157 KATZ, S. S.

"The Federal Fiscal Year," VII *National Tax J.*, 12, Dec. 1957. pp 16.

Traces development of the idea of the fiscal year which derives from congressional desire to maintain control of the budgetary process.

158 KAUTSKY, K.

Thomas More and his Utopia. London, Black, 1927. pp 250.

More's Utopia is analyzed particularly as it relates to the idea of socialism. More is understood as a product of his age, and conditioned by the transition from feudalism to early capitalism.

159 KEESING, F. M.

Culture Change. California, Stanford U. Press, 1952. B.

Analysis and bibliography of anthropological sources to 1952 with special section on innovation. Concepts of innovation should take into account the creativity of the diffusion process.

160 KELSO, L. and ADLER, M. J.

The Capitalist Manifesto, New York, Random House, 1958. pp 265.

Deals with the forms of capitalistic economic activity and their relationship to socialist theory, politics, ethics and society. Means for increasing the benefits of capitalism are discussed.

161 KERR, W. and GOTTLIEB, B.

"An Experiment in Industrial Harmony," *Proceedings,* Industrial Relations Research Assoc., 1950. pp 6.

Reports on an experiment in the effects upon employee attitudes of complete emotional and cooperative acceptance of a union by management. Union officials felt a loss of status, but worker efficiency was increased.

162 KING, J. E.

Science and Rationalism in the Government of Louis XIV. Baltimore, John Hopkins U. Press, 1949. pp 337.

A historical treatise dealing with the impact of science and rationalism on the government of France under Lous XIV. Such items as records, financial policy, science and technological education are discussed.

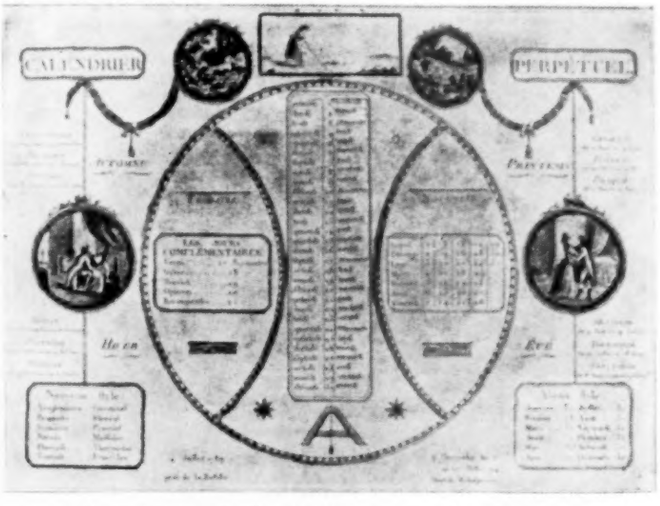
163 KLINE, M.

Mathematics in Western Culture. New York, Oxford U. Press, 1953.

A historical study of the growth of mathematical thought stressing its influence on science, cosmology, philosophy, esthetics, art, music, religion.

164 KNAPP, R. H. and GOODRICH, H. B. *Origins of American Scientists.* Chicago, U. of Chicago Press, 1952. pp 450.

Describes the development of American scientists through compilation of statistical data pertaining particularly to collegiate institutions.



A revolutionary perpetual calendar—two social inventions in one. Any date for any year can be found and read off either in the names the French Revolution gave, or of the ancient regime. From Ernest F. Henderson, *Symbol and Satire in the French Revolution,* New York: G. P. Putnam's Sons, 1912, page 400, plate 164.

165 KRAMER, Samuel N.

History Begins at Sumer, New York, Doubleday Anchor Book, 1959.

A description of the advanced level of Sumerian civilization evidenced in twenty-seven "firsts" in important inventions.

Some of the Inocent Inhabitants of y^e Moon, as they
Were Perfectly Discovered by a Telescope brought to y^e Greatest
Perfection Since y^e last Eclipse. Exactly Engraved from the
Objects, whereby y^e Curious may Guess at their Religion.
Manners &c.
Hieroglyphic Print Hogarth

166 KRETSCHMER, E.
The Psychology of Men of Genius. New York, Harcourt, Brace, 1931. pp 256.
Relates genius to heredity stating that from a biological standpoint genius is "an extreme variant of the human species." Finds correlation between physique and fields of work.

167 KRISTOF, L. K. D.
"The Origins and Evolution of Geopolitics," *J. Conflict Resolution,* March 1960. pp 36B.
Treats geopolitics and its attempts to relate political man and his natural environment.

168 KUZNETS, S.
Economic Change, New York, W. W. Norton & Co., 1955. pp 333.
Suggests need for blending a theoretical approach with empirical data in deriving a general theory of economic cycles.

169 LACY, M. G.
Food Control During Forty-six Centuries. Address before Agric. Hist. Soc. Chicago, Swift & Co., March 1922. pp 18B.
Centralized control of food supply and distribution is traced from Egypt in 2830 B. C. to the present. Food control is viewed as among earliest forms of price fixing.

170 LANGE-EICHBAUM, W.
The Problem of Genius. New York, Macmillan, 1932. pp 187.
There is no one human type that is labelled as genius. Genius, unlike talent, is not inborn. In the final analysis, society decides who is a genius. Discusses relationship of genius and insanity.

171 LASSWELL, H. D.
"Current Studies of the Decision Process: Automation vs. Creativity," *Western Pol. Q.,* VIII, pp 18.
Deals with the decision making process, methodology of the social sciences, techniques of policy formation and evaluation. Techniques of creativity and their applicability to machines are discussed.

172 LASSWELL, H. D.
"The Developing Science of Democracy," in *The Future of Government in the United States: Essays in Honor of Charles E. Merriam.* Chicago, U. of Chicago Press, 1942.
Surveys historically the various trends in the study of democracy, emphasizing scientific and social science principles. Selected studies are described and recommendations for improved methods presented.

173 LASSWELL, H. D.
"The Garrison State," *J. Sociol.,* Jan. 1941. pp 13.
Analysis of dictatorship and its sources through a discussion of 20th century Germany. Economic interest is assumed as a primary drive in political mechanisms.

174 LASSWELL, H. D.
"The Normative Impact of the Behavioral Sciences," *Ethics,* LXVII, April 1957. pp 24.
Deals with the behavioral sciences and their current applications to study of the self, of psychological influences, and of the relationship between societal ideals and industrialization.

175 LASSWELL, H. D.
"The Political Science of Science," *Am. Pol. Sci. Rev.* Dec. 1956. pp 18.
The impact of political science on man is comparable to that of the physical and biological sciences. The past and potential applications of science to armaments, production and evolution are discussed.

176 LAUFER, B.
"A Theory of the Origin of Chinese Writing," *Am. Anthrop.,* IX, 1907. pp 5.
Chinese writing is a result of ornamentation and symbolization and not an outgrowth of pictographic art as was previously believed.

177 LECKY, W. E. H.
History of the Rise and Influence of the Spirit of Rationalism in Europe. New York, Appleton, 1906. pp 405 & 386 (2 vols).
A study of the "predispositions" in Europe which led to the aesthetic, scientific and moral developments of Rationalism, the secularization of politics and the rise of industrialism.

178 LECLERQ, R.
La Création Scientifique. Paris, Gauthier-Villars, 1959. pp 86.
Certain modes of research and living are favorable to invention. Scientific invention is part of creative acts in general which require tension, incubation and inspiration.

179 LEHMAN, H. C.
"The Age Decrement in Outstanding Scientific Creativity," *Amer. Psychologist,* XV, February 1960. pp 6.
In a study of 44 chemical discoveries the author finds that the "best reports" and the breakthroughs were achieved most often by chemists between ages 25 through 30. Quantifies the rate of growth in scientific achievement, criticizing previous work on the subject; notes that "*really great* contributions to science have been increasing at a slower rate than have run-of-the-mine contributions."

180 LEIGHTON, A. H.
Human Relations in a Changing World Observations on the Use of the Social Science, New York, Dutton, 1949, pp 354.
Analyzes social science investigations of the Japanese "will to war." Finds that moral values dominate scientific values at three points: problem choice, limitation of human and other materials to be used, and use of results. In investigation itself, scientific values must prevail.

181 LEONTIEF, W. W.
"Input-Output Economics," *Scientific American,* Oct. 1941, pp 6.
Offers a new approach to economics through analysis of the fixed-flow relationships between different sectors of the economy.

182 LERNER, D. and LASSWELL, H. D. eds.
The Policy Sciences: Recent Developments in Scope and Method. Stanford, Stanford U. Press, 1951 pp 344B.
Social sciences are "policy making" when engaged in planning. Symposium of 16 articles surveys the present conception and methodology of the policy sciences and their possible uses. Contains unusually good and relevant bibliography.

183 LETOURNEAU, C.
Property: Its Origin and Development. London, Walter Scott, 1899.. pp 401.
An account of the evolution of the right to property with examples from natural history and from all major civilizations. Advocates gradual change in ownership through inheritance tax.

184 LEWISOHN, R.
Science, Prophecy, and Prediction: Man's Efforts to Foretell the Future—From Babylon to Wall Street. New York. Harper, 1961.
Generally skeptical, but holding a social-scientific position of the "from-alchemy-to chemistry" kind.

185 LEWIS, N. D. C.
"The Future of Psychotherapy," *Amer. J. of Psychotherapy,* XV, April 1961. pp 9.

A broad, perceptive look at the status and aims of present-day psychotherapy, and an outline of 11 "forward movements." Asks, "Will the therapist assume the role of a master healer of individuals or become a human engineer of the collective unconscious?"

186 LIKERT, R. and LIPPITT, R.
"The Utilization of Social Science," in *Research Methods in the Behavioral Sciences,* L. Festinger and D. Katz, eds. pp 65B.

Case study approach to determine methods of applying social sciences to planned change. Success in achieving change grew out of "town-meeting" attitudes.

187 LILLEY, S.
Men, Machines and History. London, Cobbett Press, 1948. pp 205.

Divides the history of mechanical development into several industrial revolutions. Finds that social institutions and trends to monopoly have retarded technical advance.

188 LINDEMAN, E. C.
Social Discovery: An Approach to the Study of Functional Groups. New York Republic Pub., 1925. pp 375.

Social science as a scientific procedure will provide the clarity needed for social invention. Attempts to formulate procedural framework for social science.

189 LIONBERGER, H. F.
Adoption of New Ideas and Practices; a summary of the research dealing with the acceptance of technological change in agriculture, with implications for action in facilitating such change. Ames: Iowa State U. Press, 1960. pp 164.

190 LIPPMANN, W.
The Good Society, Boston, Little Brown, 1937. pp 402.

Examines the extent and effectiveness of possible planning of the social order. Historical examination finds no positive correlation between wealth and state power. Calls for a "reconstructed" liberalism and society of free men using all their faculties.

191 LITTLE, K.
"Applied Anthropology and Social Change in the Teaching of Anthropology," *Br. J. of Soc.,* XI, Dec. 1960. pp 16.

Both applied and academic anthropologists are concerned with acculturation and social change, both require knowledge of their own society's institutions. The applied anthropologist should have "means of studying culture contact and change dynamically and as a method of predicting social process," in his own culture as well as others,

192 LOMBROSO, C.
The Man of Genius. London, Walter Scott 1891. pp 370.

Genius is regarded as a manifestation of the diseased mind. The presence of pathological signs is demonstrated with material from the life histories of men of genius. Genius is differentiated from talent as stemming from an irresistible impulse. Race and heredity have bearing on genius.

193 LOWIE, R. H.
The Origin of the State. New York, Harcourt, Brace, 1957. pp 117.

Discusses the concept of the state and its relationship to the level of advance of a society.

194 LYMBURN, J.
"Natural History of the Roman Numerals," *Nature,* 1887. pp 2.

Roman numerals in their primitive forms articulately symbolized a quinary notation based on the hand sign V. Numbers were first thought of as representing fingers and hands.

195 LYND, R. S.
"The Implications of Economic Planning for Sociology," *Am. Soc. Rev.,* IV, 20, Feb. 1944. pp 7.

Economic planning is inseparable from other planning areas. American acceptance of planning is changing from an emergency to a permanent basis.

196 LYND, R. S.
"Planned Social Solidarity in the Soviet Union," *Am. J. Soc.* Nov. 1945. pp 15.

Studies Soviet Communist methods for removing old and preventing new societal rifts.

197 MacDOUGAL, M. S. and LIPSON, L.
"Perspectives for a Law of Outer Space," *Am. J. Intl. Law,* 52, July 1958. pp 25.

Lists fundamental questions in formulation of space law including strategic implications.

198 MACKENZIE, F.
Planned Society: Yesterday, Today and Tomorrow. New York, Prentice-Hall, 1937. pp 920B.

Traces planning from primitive to present societies. Considers political and philosophic implications.

199 MacLAURIN, W. R.
"The Sequence from Invention to Innovation," *Q. J. Economics,* Feb. 1953, pp 14.

Relates economic development to a society's propensity to invent and innovate, and its ability to accept and utilize inventions and innovations.

200 MacLEOD, W. C.
The Origins and History of Politics. New York, John Wiley, 1931. pp 540B.

A broad historical view of political institutions and their development in all parts of the world.

201 MAINE, H. S.
Lectures on the Early History of Institutions. London, John Murray, 1890. pp 412.

Investigates general character of legal and social history. Compares influence of Roman and Common Law.

202 MALTZMAN, F. *et al.*
"Experimental Studies in the Training of Originality," *Pyschol. Monographs Gen. & Applied,* 1960. pp 23.

Originality is learned behavior and varies as a function of the same antecedent conditions as other forms of operant behavior.

203 MANNHEIM, K.
Man and Society. London, Kegan Paul Ltd. 1939. pp 469B.

Observes crisis of liberalism in Anglo-Saxon and Continental thinking. Discusses desirability of planning and its compatibility with freedom.

204 MARCSON, S.
The Scientist in American Industry. Princeton, Princeton U. Industrial Relation Section, 1960.

A depth portrayal of problems encountered by the industrial research scientist, based on extensive interviews with research scientists, and administrators. Traces the scientist's career development, professional aspirations, relations with colleagues in team work organization, and reactions to managerial authority. Stresses the kind of accommodation which must be made in research administration between two contradictory concepts of organization—"one based upon executive authority exercised by the corporation and the other stemming from the natural inclination of the scientist to respect the authority of his professional colleagues."

205 MATTINGLY, G.
Renaissance Diplomacy. London, 1955.

Classic study of the origins of continuous diplomacy, invented in Renaissance Italy to gratify demands that the city-state system had developed. It diffused in the 16th century through central and western Europe, where the nation-states used it in developing a continental state system.

206 McGEARY, N. M.
The Development of Congressional Investigating Power. New York, Columbia U. Press, 1940. pp 172B.

Deals with the history and purposes of congressional investigations. Personal ambitions of Congressmen are an important factor in selecting topics for investigations. Future investigations on questions of broad public interest should be undertaken by special commissions.

207 McGREGOR, D.
"The Major Determinants of the Prediction of Social Events," *J. Abnorm. Psychol.* April 1938. pp 25B.
A questionnaire study reveals that prediction is primarily determined by the stimulus situation and by wishes, opinions and attitudes rather than by relevant information.

208 McKEE, E. M.
The People Act. New York, Harper, 1955. pp 269.
Democracy shows itself best in works. Cites examples of twelve American communities in their successful struggles for better housing, new schools and hospitals, youth programs and limited racial integration.

209 MEAD, M.
Cultural Patterns and Technical Change. Holland, Unesco, 1954. pp 348B.
Discusses social change brought about by the influences of western law, culture and technology, on non-western areas.

210 MEAD, M.
"On Methods of Implementing a National Morale Program," *Applied Anthrop.*, Oct. 1941. pp 5.
Cites a strong need for personal identification as well as opportunities for emulation. A morale movement needs natural as opposed to appointed leaders.

211 MELSON, A. G. van,
From Atomos to Atom. Pittsburgh, Duquesne U. Press, 1952. pp 240B.
History of the atom concept discussing the philosophic background of atomic theories and the philosophic interpretation of physical theories. The limits of philosophy, the science of nature and their mutual relations are delineated.

212 MELTON, J. S. and BENSING, R. C.
"Searching Legal Literature Electronically: Results of a Test Program," *Minn. Law R.*, XLV, Dec. 1960. pp 30.
Theory, procedures of a system in which a computer supplies answers, in the form of citations, to questions ranging from a request for cases containing certain specific words to requests for cases containing legal concepts.

213 MENZEL, H.
"Innovation, Integration, and Marginality: A Survey of Physicians." *Amer. Soc. R.*, XXV, October 1960. pp 9.
A preliminary study suggests that innovations are not necessarily adopted most readily by marginal men; different innovations are adopted first by individuals in different positions in the social structure.

214 MERRIAM, C. E.
The Making of Citizens. Chicago, U. of Chicago Press, 1931. pp 371.
Discusses origins of various national attitude patterns through comparative study of 8 national systems of civic education.

215 MERRIAM, C. E.
"The National Resources Planning Board: A Chapter in American Planning Experience," *Am. Pol. Sci. Rev.*, Dec. 1944. pp 13.
Recommends the establishment of a permanent planning committee representing all interest groups and appointed by the President.

216 MERRIAM, C. E.
New Aspects of Politics. Chicago, U. of Chicago Press, 1931. pp 253.
Discusses the scientific approach to politics and the need for its application in intelligent social control.

217 MERTON, R. K.
"Science and the Social Order," *Philosophy of Sci.*, July 1938. pp 16.
Change in institutional structure is the basis for all change. Pure and applied science have created a conflict of interests among social groups; those favorable and those opposed to technological change.

218 METRAUX, A.
"The Revolution of the Ax", *Diogenes*, 25, Spring 1959. pp 12.
Traces the history of the ax in relation to the development of society in basically primitive cultures.

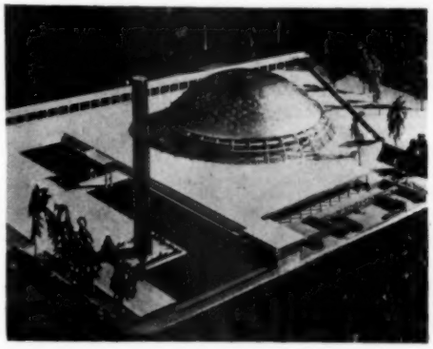
219 MILLET, J. D.
The Process and Organization of Government Planning. New York, Columbia U. Press, 1947. pp 181.
Assumes that an educated public will accept the necessity of planning and aims to so educate. Present acceptance of full employment as a government policy necessitates economic planning which should be formalized by organization and procedure.

220 MILLETT, J. D. and ROGERS, L.
"The Legislative Veto and the Reorganization Act of 1939," *Pub. Admin. Rev.*, I, 1941. pp 13.
The Reorganization Act of 1939 is an invention which creates a new balance between executive and legislature through the legislative veto. A similar balance is recommended for all cases where congress cannot, or should not, determine details. The origin of legislative delegation and the veto are traced.

221 MISES, L. von
"Social Science and Natural Sciences," *J. Sociol. Philosophy*, VII, 1942. pp 13.
The social scientist must rely on historical experience rather than the experiment of the physical scientist and cannot hope to find constant or measurable relations. However, the social scientist has an advantage in knowing what is going on inside his subject—the human being.

222 MOLES, A.
La Création Scientifique. Geneva, Editions René Kister, 1957. pp 237B.
Scientific discovery is free of structure and has its source in spontaneous mental activity, unlike completed science which is shaped into a body of knowledge according to well classified norms. Scientific style is a function of the character of the researcher and expresses an internal aesthetic sense.

223 MONTMASSON, J.
Invention and the Unconscious. New York, Harcourt, Brace, 1932. pp 326B.
Asserts that inventions are not thought out but are generated in the unconscious of rare individuals. This human quality has its parallel in the adaptability of other forms of organic life to their environment.



Building ancient symbols and design into modernistic forms. Doxiadis' design for the Cathedral of Axum, Ethiopia (Doxiadis Associates, Athens, Greece and Washington, D.C.

224 MORENO, J. L.
Sociometry—Experimental Method and the Science of Society. New York, Beacon House, 1951. pp 220.
Low cohesion of groups in society can be altered by new social inventions without sacrificing spontaneity and freedom.

225 MORGAN, A. E.
The Community of the Future. Ann Arbor, Braun-Bransfield, 1957. pp 161B.
Argues for the small community, pointing out its value as a root source of national spirit and creativity.

226 MORNET, D.
Les Origines Intellectuelles de la Révolution Francaise 1715-1787. Paris, Armand Colen. 1933. pp 552B.
Utilizing a mass of original sources the author attempts to discover the relationship between writings of criticism and discontent, and the French Revolution. Interest is in the effect and diffusion of revolutionary ideas through different levels of writers from writers to the public, and from urban to rural areas.

227 MULLINS, C. J.
"Selection of Creative Personnel," *Personnel J.*, XXXIX, May 1960. pp 2.
Partially successful attempt to establish the validity of nine Guilford creativity tests in predicting relative creativity among a group of research scientists.

228 MUMFORD, L.
Technics and Civilization. New York, Harcourt, Brace, 1934. pp 495B.
Traces development of technology over a span of 10 centuries ending with an appeal for a safe social use of our mechanical environment.

229 MURPHY, G.
Human Potentialities. New York, Basic Books, 1958. pp 340.
Treats man's potential to change the world and himself with it. Human potentialities arise from the integration of the three human natures—biological, cultural, and the "curious" wherein the will to understand is dominant. The integration of the 3 natures represents, through emergent interaction, the fulfillment of the resources of the world.

230 MURRAY, H. A.
"Vicissitudes of Creativity," in *Creativity and Its Cultivation,* H. H. Anderson ed. New York, Harper, 1959. pp 22.
Formulates basic requirements for creativity at all levels but finds it impossible to predict when the right entities will occur and/or interact. Discusses the role of the ego and the unconscious in creativity, as well as creativity in interpersonal relationships and in different cultural epochs.

231 MUSSON, A. E. and ROBINSON, E.
"Science and Industry in the Late Eighteenth Century," *Econ. Hist. R.*, XIII, Dec. 1960. pp 23.
A case study of early Manchester industrialists suggests that a substantial minority of them, including the most significant, were strongly interested in the new scientific knowledge, for both utilitarian and intellectual reasons.

232 NAESS, A.
"A Systematization of Gandhian Ethics of Conflict Resolution," *J. Conflict Resolution,* II, 2, 1956. pp 15.
Abstracts from the writings of Gandhi a hierarchy of norms and hypotheses to form a systematic philosophy of non-violence in resolving conflict. The system is then applied and tested against Gandhi's actual programs. Suggests areas where his systematic conception may be employed in resolving international tension.

233 NELSON, B.
Sigmund Freud: On Creativity and the Unconscious. New York, Harper, 1958.
Selections, with annotations, from *The Collected Papers.*

234 NELSON, R. R.
"The Economics of Invention: A Survey of the Literature," *J. Business,* 32, April 1959. pp 26.
There are 2 aspects of the economics of invention: invention is strongly motivated by profit opportunities, and great uncertainty often faces this activity. The author urges a thorough examination of rate and direction of inventions and the effect of uncertainty on research and development.

235 NETTL, P.
The Story of Dance Music. New York, Philosophical Library, 1947. pp 343B.
Study of dance music and the interactive development of music and dance. A coordinated growth is implied. Historical approach is used with recourse to psychology, anthropology and other relevant disciplines when appropriate. Relationship of music and dance to their religious and cultural contexts is stressed.

236 NEWELL, A. *et al.*
"Elements of a Theory of Human Problem Solving," *Psychol. Rev.*, 1958. pp 15.
Problem-solving theory should predict performance, handle specific tasks and explain how human problem-solving takes place as well as predict and relate incidental phenomena that accompany the problem-solving process.

237 NEWMAN, James R.
The World of Mathematics. New York, Simon & Schuster, 1956. pp 2535 (4 vols.).
An anthology treating history of mathematics, pure and applied mathematics, psychology of mathematics and other subjects. Considers math as a tool and language which is created by men but apart from them.

238 NORDENSKIÖLD, E.
"The American Indian as an Inventor," *J. Royal Anthrop. Inst.*, 59, 1929. pp 36B.
Distinguishes between independent invention, culture loans, and parallel inventions. Existence of appropriate cultural and technical antecedents is criteria for determining independent inventions which are more frequent where tribes are prosperous. Necessity is not the mother of invention.

239 NURETTINSAZI, Kösemihal
"Sociometry and Cybernetics," *Group Psychotherapy,* vol. 12, March 1959. pp 13.
Discusses value of sociometry and its methods in investigating social phenomena. Compares sociometry and cybernetics superficially. High value is placed on human spontaneity and creativity as opposed to mechanical reliability.

240 ODEGARD, P.
"The Political Scientist in the Democratic Service State," *J. Politics,* 2, 1940. pp 24.
Political scientists as educators, critics and researchers must be devoted to preventing the democratic service state from becoming a totalitarian servile state.

241 OGBURN, W. F.
The Evolution of the Family. Rome, 1937. pp 16.
Traces the evolution of marriage and the family noting the research difficulties in studying prehistoric institutions. Predicts increasing family instability.

242 OGBURN, W. F.
"The Influence of Invention and Discovery," in *Recent Social Trends,* New York, McGraw-Hill, 1933. pp 44.
Studies the relationship of mechanical invention to social change. Indicates areas where society adjusts to invention. A survey of some then recent inventions is made to determine their effects on society. One example, the radio, is carried out in detail. Policy problems raised by invention are discussed.

243 OGBURN, W. F.
"Inventions, Population and History," in *Studies in the History of Culture*, ACLS, Menasha, Wis., 1942. pp 13.
Though social forces flow from human beings, inventions serve as stimuli for social change. Cites examples where technical inventions affected demography which in turn shaped historical events. Great historical phenomena are seen as result of clusters of great inventions.

244 OGBURN, W. F.
Social Change. New York, B. W. Huebsh, 1922. pp 365.
Concern is with mental and cultural bases of invention. Inventors are generally the most intelligent members of a group regardless of the group intelligence level. Inventions are limited by their cultural context and are often merely a recombination of previously invented things.

245 OHASHI, R.
"The Study of Statistics in Japan: Its Development, Present State and Future Task," *Kyoto U. Econ. R.*, XXIX, Oct. 1959. pp 38.
Traces the use of administrative statistics from the 4th century to the present, classifies current Japanese statisticians in terms of their political as well as theoretical orientations, and advocates that "the Japanese science of statistics . . . find a sound logic in itself, resting on the theory of social science framed from the position of the laboring classes."

An example of the many jokes on the first trains. Here an incredulous English parson is told that a horse inside really does the work.

246 OPLER, M.
"The Creative Role of Shamanism in Mescalero Apache Mythology," *J. Am. Folklore* 59, 1946. pp 13B.
The shaman, in his effort to justify and rationalize the importance of his power source, "rewrites" and creates mythology.

247 ORWELL, G. *1984*. New York, Harcourt, Brace, 1944.
A novel which projects future life by carrying to possible extremes inventions and conditions which now exist. Envisions such devices as spying T.V. screens, machine-written music. Machine-made equilibrium is insufficient to replace human values.

248 PACKARD, Vance
The Hidden Persuaders. New York, David McKay, 1951.
Discusses motivational research and its applications in manipulating purchase decisions. Trend is regarded as a regression in man's striving for rationality which poses moral problems.

249 PANOFSKY, E.
Gothic Architecture and Scholasticism. Pa., Archabbey Press, 1951. pp 156.
It is no accident that a clear historical parallelism exists between Gothic architecture and Scholastic philosophy. Architecture responded to the whole cycle of scholasticism. Such continuous sensitivity to philosophic change could not have been only chance.

250 PARSONS, E. C.
"Anthropology and Prediction," *Am. Anthrop.*, 44, 1942. pp 7.
Anthropology should be viewed as a predictive and applied science. Anthropologists as advisors to foreign missions, group settlement programs, etc., are recommended.

251 PAWLE, G.
The Secret War, London, Geo. G. Harrap, 1956. pp 297.
Discusses importance of scientific contributions to war methods. Traces specific inventions.

252 PERRY, R. B.
"The Moral Norm of Social Science," *J. Social Philosophy*, V, 16, 1939.
The subject matter of all the social sciences has a common fundamental purpose and should not be subject to academic or literary isolation. The goal is to formulate a system of integrated or compatible concepts based on comparison with fact. Compatibility in each system is a moral goal and the systems are moral institutions.

253 PERSONS, W. M.
Government Experimentation in Business. London, Chapman & Hall, 1934. pp 268.
A survey of government in business which views government participation as valueless and wasteful.

254 PETTEE, G. S.
The Process of Revolution. New York, Harper, 1938. pp 167.
A study of the process of revolution from its sources, to the post-revolutionary society. Theoretical discussion with some specific references to historical data.

255 PITTMAN, R. H.
"Changes in Concepts of Sociology," *Soc. and Social R.*, XLV, Oct. 1960. pp 7.
A preferential list of concepts in sociology obtained from 116 sociologists in 1959 contains 39 concepts in the highest 50 of those given in a similarly obtained list in 1945.

256 PLANT, A.
"Economic Theory Concerning Patents," *Economica*, 14, Feb. 1934. pp 22.
Treats the effects of the patent system on invention and on the economy. Finds much confusion behind the "economic theory of patents" and a lack of theoretical principle behind the whole patent system.

257 PLATO
The Republic. New York, Mentor Classics. pp 303.
Plato's theses of what constitutes the ideal, and therefore the real world and its governing principles. Sets up a utopian standard of communal organization.

258 PLATZ, A., and BLAKELOCK, E.
"Productivity of American Psychologists: Quantity vs. Quality," *Am. Psychol.*, May 1960. pp 3B.
Assesses relation of quality and quantity in psychological research. Doubtful that high producers do better research, but they make a greater contribution to the field in absolute number of high quality articles.

259 POINCARÉ, H.
"Mathematical Creation," in *The Foundations of Science*, H. Poincaré, ed. New York, Science Press, 1913. pp 11.
Observations of the process of mathematical creation as it occurred in the author's experience. Discusses the role of the unconscious, the sudden illumination and conscious work. Not all individuals have a feeling or intuition of mathematical order, but those who possess it can create. The choice of thought combinations which emerge from the unconscious is determined by an esthetic sense.

260 POLTI, G.
The 36 Dramatic Situations. Franklin, Ohio, J. K. Reeve, 1924. pp 182.
A list of the 36 principal dramatic situations in the theatre. Maintains that this is the maximum possible. Lists treatre pieces that fall under each situation.

261 PORTERFIELD, A. R.
Creative Factors in Scientific Research. Durham, N.C., Duke U. Press, 1941. pp 282.
Illustrates and isolates psychological, cultural and creative factors in the invention process. Examples from physical, biological and social sciences. Cites recent trends and implications for social control.

262 RABELAIS, F.
The Amazing Adventures of Gargantua and his Son Pantagruel. Boston, Houghton, Mifflin, 1940. pp 250.
A satirical fable on the government and institutions of France in the fifteenth century. A great concern with crafts and with new inventions and sciences. See scholastic thoughts stifling creativity.

263 RADIN, P.
Primitive Man as Philosopher. New York, D. Appleton, 1927. pp 401.
It is mistaken to assume that primitive man had no philosophy. Cites evidence to prove these assumptions false.

264 RANDLE, C. W.
"Problems of Research and Development Management." *Harvard Bus. R.*, XXXVII, Jan.-Feb. 1959. pp 9.
Report on a field survey of the research and development programs of some 100 concerns, and their effectiveness and position within the concern.

265 RANK, O.
Art and Artists. New York, Alfred Knopf, 1932. pp 431.
Discusses the creative urge in the arts with relation to personality traits of the artist.

266 REDFIELD, R.
The Primitive World and its Transformations. Ithaca, N.Y., Cornell U. Press, 1953. pp 179.
A series of lectures on anthropology tracing changes which mankind has undergone in the passage from pre-civilized to civilized life.

267 RIDGEWAY, W.
The Origin of Metallic Currency and Weight Standards. London, Cambridge U. Press, 1892. pp 417.

Surveys the earliest uses of currency and weight standards; their diffusion among various cultures; and the similarities and differences in their place among known ancient civilizations. Anticipates Karl Jung in substituting deep psychological explanations for technical scientific ones.

268 ROE, Anne
"A Psychological Study of Eminent Psychologists and Anthropologists, and a Comparison with Biological and Physical Scientists," *Psychological Monograph*, LXVII, 2, 1953. pp 55.
Investigates relationships between life history, intellectual functions or personality characteristics, and the selection and pursuit of a particular science as a profession. Conclusions are based on interviews and psychological tests.

269 RONHEN, H. O. and LAWRENCE, P. R.
Administering Change: A Case Study of Human Relations in a Factory. Cambridge, Harvard U. Press, 1952. pp 324B.
Studies the impact of introducing a new product into a production set-up and the consequent alteration in the relationships between various groups.

270 ROSSMAN, J.
The Psychology of the Inventor. Wash., D.C., Inventors Publishing Co., 1931. pp 252B.
Pioneer study of influences shaping the inventor including heredity and existing inventions. Stresses possibility and utility of a general theory of invention.

271 RUSSO, F.
"La création scientifique et technique," *Études*, XCIII, April 1960. pp 13.
Characteristics of social and technical invention, relations to culture and to labor.

272 RUTTAN, V. W.
"Usher and Schumpeter on Invention, Innovation and Technological Change," *Q. J. Econ.*, LXXIII, Nov. 1959. pp 10.
Social processes which produce inventions and those producing innovations are economically and sociologically different. Inventions are acts of insight, unlearned. Innovations are the setting-up of new production functions. Technical change is any shift in the production function.

273 SANTAYANA, G.
The Life of Reason, or The Phases of Human Progress, Vol. II of *Reason in Society*. New York, Scribners, 1946, pp 205.
The function of reason is to create symbolic representations which orders the "natural flux" of existence. The act of reasoning has value and beauty. Religion, art and science are modes of expression for reason. Social invention occurs when current ideals fail to satisfy the variety of individual aspirations.

274 SCHUR, E.
"Scientific Method and the Criminal Trial Decision," *Social Research*, XXV, June 1958. pp 17B.
Discusses obstacles in applying scientific method to criminal law; particularly in determining guilt or innocence at trial. Extralogical factors in judgment block legal certainty. New modes of analysis are needed. Law must be viewed as an aspect of social reality, not in terms of rules and rule-logic.

275 SCHWAB, J. J.
"What do Scientists do?" *Behavioral Science*, V, 1, Jan. 1960. pp 27B.
Alternative patterns of scientific inquiry are few. Reductive and holistic principles endure in scientific investigation. The scientist "invents" by selecting his set of techniques for a particular topic. Topic is often determined by personal history of inquirer.

276 SEIMER, S. J.
Suggestion Plans in American Industry. Syracuse, N.Y., Syracuse U. Press, 1959. pp 66.
Conversations with executives and suggestion-plan managers at selected plants are basis for discussion of uses, implementation and problems of suggestion-plans.

277 SIMEY, T. S.
"The Contribution of Sidney and Beatrice Webb to Sociology," *Br. J. of Soc.*, XII, 2, June 1961. pp 18.
The Webbs' interest in the world was a general and empiric one; they were critical of abstract theorizing, they wanted to ally fact and theory with preference for inductive method. "The whole of social life, the entire structure and function of society consists of human intervention." Though "some sort of human society may get along upon instinct, civilization depends on organized knowledge of sociological facts and of the connection between them."

278 SIMS, N.
The Problem of Social Change. New York, Thomas Crowell, 1939. pp 477B.
Comprehensive review of social change causation theories from primitive concepts to Sorokin's cyclical process theory. Poses problem of maintaining both equilibrium and dynamism in society.

279 SMITH, B. L., LASSWELL, H. D. and CASEY, R. D., eds
Propaganda, Communication and Public Opinion. Princeton, Princeton U. Press, 1946. pp 435B.
A comprehensive annotated anthology of 150 essays, many of which deal with inventions.

280 SMITH, P., ed.
Creativity: An Examination of the Creative Process. New York, Hastings House, 1959. pp 224.
A series of essays dealing with the nature of the creative process and with creativity in a number of specialized areas.

281 SPENCER, H.
An Autobiography. New York, D. Appleton & Co., 1904. pp 613.
Reveals the accidental manner in which Spencer arrived at his theories of evolution.

282 STECCHINI, Livio C.
"The Historical Problem of the Fall of Rome," *J. of General Education*, V, 1950. pp 31.
Lists the main theories about the causes of the decline of ancient civilization and classifies them according to historical method. Contains a translation by Christian Mackaver of Max Weber's essay on "The Social Causes of the Decay of Ancient Civilization."

283 STECCHINI, Livio C.
"The Origin of the Alphabet," *American Behavioral Scientist*, IV, 6, February 1961. pp 5.
Some unheralded Sumerian grammarian probably devised a primitive alphabet as a divining, abacus-like instrument formed in a sixteen-letter square. Its purpose was to allow divine voices to "speak" in the language of the land.

284 STEIN, Morris
"A Transactional Approach to Creativity," *The 1955 University of Utah Research Conf. on the Identification of Creative Scientific Talent*. C. W. Taylor ed. Salt Lake City, U. of Utah Press, 1956. pp 10.
Stresses social and psychological factors in the determination of creativity. Psychological, biographical and performance data for 46 industrial research chemists provide the basis for conclusions on determinants of creativity.

285 STEIN, M. I.
"Creativity and Culture," *J. Psychol.*, XXXVI, 1953. pp 11.
Analyzes the nature of creative products and draws inferences concerning the psychological processes involved in their creation. The relation of cultural factors to these processes and the evaluation of their products is discussed. The stage of development of the culture helps to define the areas in which problems will be seen and the means available for solving them.

286 STEIN, M. T. and HEINZE, S.
Creativity and the Individual. Free Press, Glencoe, 1960. 428B.
Surveys wide scope of research on individual creativity, abstracting about 400 items from the literature of psychology and psychiatry. Describes a variety of methodologies and conclusions.

287 STERN, B. J.
"Frustration of Technology," *Science & Society,* II, Winter 1937. pp 28.
Fundamental inventions are stillborn and entire lines of potential development unrealized because of prevailing social attitudes, generally determined by socio-economic factors. Inventions flourish only in the proper milieu. Based on Marxian assumptions.

288 STONE, M. H.
"Science and Statecraft," *Science Mag.,* 108, 1947. pp 3.
Points out need for increasing applications of social science to government planning and urges refinement of social science methodology.

Visiting cards were invented in Venice in the sixteenth century. It was fashionable to adorn them with designs expressly engraved by noted artists.

289 SUMMERFIELD, J. and THATCHER, L. eds.
The Creative Mind and Method. Austin, U. of Texas Press, 1960.
Views of men such as Frank Lloyd Wright and Robert Penn Warren on a working definition of true creativity toward discovering "useful and increasingly accurate ways of looking at our culture and ourselves."

290 SURANY-UNGER, T., Jr.
Current Projects on Economic and Social Implications of Scientific Research and Development 1960. Washington, D. C., NSF, 1960.
A survey of work in progress, almost none it published. Useful in projecting the intellectual output of a dozen sub-fields—among them administration, sociology, political science, international relations, management, public policy and national defense studies—several years hence.

291 TAGLIACOZZO, G.
"The Tree of Knowledge," *American Behavioral Scientist,* IV, 2, October 1960. pp 7.
A taxonomical chart illustrating the fundamental unity, the genealogical development, the history, and the contemporary panorama of the many fields of human knowledge. Useful in the search for origins and ramifications of old and new ideas.

292 TALLMADGE, W. H.
"The Composer's Machine," *J. of Aesthetics and Art Criticism,* XIX, Spring 1961, pp 7.
An aesthetic theory, suggesting that "By directing the attention of teacher and performer to the structure of the music as the authoritative basis of performance, insight and analytical ability will grow and develop."

293 TARDE, G.
The Laws of Imitation. New York, Henry Holt, 1903. pp 404.
Presents a general theory of society in terms of imitation and invention. Imitation causes all social likeness and tends toward indefinite progression through logical and extra-logical processes. Innovation combines prior imitation with extraneous accretions.

294 TARDE, G.
La Logique Sociale, Paris, Germer Baillière, 1898. pp 466.
Companion work to *Laws of Imitation* presents a logical system in which change is the result of a social dialectic. Civilization flowers where new ideas are given free entry and contradictions are tolerated.

295 TAUSSIG, F. W.
Inventors and Money Makers. New York, Macmillan, 1930. pp 138.
The instinct of contrivance may be evoked spontaneously or mixed with other motivations, but the direction in which the contriver turns is affected by the prospect of gain.

296 TAYLOR, Carl C.
"Social Science and Social Action in Agriculture," *Social Forces,* XX, 1, Oct. 1941. pp 5.
Discusses role of sociological research in directed social change. Examples are drawn from research undertaken in connection with large Federal programs in agriculture.

297 TAYLOR, D. W., BERRY, P. C., and BLOCK, C. H.
"Does Group Participation When Using Brainstorming Facilitate or Inhibit Creative Thinking?" *Admin. Sci. Q., III,* June 1958. pp 25.
Reports an experiment to answer the title question by comparing performance of individuals and groups. Groups are markedly inferior with respect to number of ideas, number of unique ideas and quality of ideas produced.

298 TAYLOR, F. V.
"Four Basic Ideas in Engineering Psychology," *Amer. Psychologist,* XV, Oct. 1960. pp 7.
These relate to "the limited flexibility of man, the concept of the man-machine system, the importance of human input-output relationships, and the use of engineering models to describe the behavior of the human elements within the system. However, only in the case of one type of man-machine complex—'the closed-loop control systems'—has the system concept been truly technologically productive."

299 TAYLOR, Isaac
The Alphabet: An Account of the Origin and Development of Letters. London, Kegan Paul, Trench & Co., 1883. pp 358 & 398 (2 vols.).
Traces development of European, Iranian and Indian alphabets from the Semitic, and originally from Egyptian hieroglyphics. Relies on comparative analysis and conjecture. Concludes that the greatest changes result from accumulations of almost imperceptible variations, on the basis of fixed laws.

300 TAYLOR, P. A. M. and ARRINGTON, L. J.
"Religion and Planning in the Far West: The First Generation of Mormons in Utah," *Eco. Hist. Rev.,* XI, 1, Aug. 1959. pp 15.
A combination of religious and economic aims suported the vast Mormon colonizing enterprise in the West. A system of tithing enabled the Church to control surplus resources and employ them for public purposes.

301 TAYLOR, Paul S.
"The Relation of Research to Legislative and Administrative Decisions," *J. Social Issues,* III, 4, Fall 1957. pp 10.
Social scientists contribute to intelligent political decisions, but much must still be done to understand decision process, to clarify issues, and to develop policy alternatives.

302 TEGGART, F. J. and HILDEBRAND, G. H. eds.
The Idea of Progress: A Collection of Readings. Berkeley, U. of Cal. Press, 1949. pp 457.
Collection of brief excerpts from well-known works by 43 authors from Hesiod to Darwin. Introductory essay finds that progress has been considered as "a necessity of nature" and suggests that it be seen as a "possibility relative to the attainment of projected ethnic objectives of action."

303 TEMPLE, R. C.
"Beginnings of Currency," *J. Royal Anthrop. Institute,* II, 1 & 2, 1899. pp 23.
Traces evolutionary development of exchange of goods from barter to money. Numerous intermediary cases are cited.

304 TERMAN, L. M.
"Scientists and Nonscientists in a Group of 800 Gifted Men," *Psychological Monograph,* LXVIII, 1954. pp 44.
On the basis of an examination of the educational and vocational records of 800 men classified according to vocational fields, variables are isolated relating a wide scope of background elements to vocational choice, and achievement.

305 THOMSON, G.
The Foreseeable Future. Cambridge, Cambridge U. Press, 1955. pp 166.
Considers the future of such areas of technology as energy materials, food, meteorology, biology. Assumes that "developments which do not contradict known principles and which have an obvious utility will be made."

306 THURSTONE, L. L.
Creative Talent. ("Reports from the Psychometric Laboratory," #61.) Chicago, U. of Chicago Press, 1950, pp 10.
Suggests various hypotheses for the study of creative talent. Creative talent is not the same as intelligence and is distinguished by the moment of insight. Studies of creativity should include objective tests of temperament and tests of the primary factors (the 2 closure factors, several space factors, the inductive factor, and several memory factors). Percentual functions and perseveration should also be observed.

307 THURSTONE, L. L.
The Scientific Study of Inventive Talent. ("Reports from the Psychometric Laboratory," #81.) Chicago, U. of Chicago Press, 1952. pp 6.
Discusses several hypotheses regarding the nature of creativity and several experimental tests that might be utilized. Creative talent is qualitatively the same at all levels of problem solving and includes the moment of insight followed by explicit and deductive thinking in testing the new idea. Suggests study of pre-insight period.

308 TOUT, T. F.
Administrative History of Medieval England. Manchester, Longmanns, Green, 1920. pp 2337 (6 vols.).
Traces development of major administrative methods and offices in medieval England.

309 TRUMAN, David B.
"Public Opinion Research as a Tool of Public Administration," *Public Admin. Rev.*, V, 1, Winter 1945. pp 10.
Uses of opinion research in administration for testing hypotheses, pre-testing projected programs, evaluating on-going programs, and facilitating informational aspects of operating policy. Academic analysts can use opinion research to narrow the area of unsupported assumptions.

310 USHER, A. P.
A History of Mechanical Inventions. Boston, Beacon Press, 1929. pp 401B.
A history of technology and its importance in cultural and economic history. Correlates economic, social, artistic, military, educational and religious development with technological advance.

311 VAIHINGER, H.
The Philosophy of 'as if' : A System of the Theoretical, Practical and Religious Fictions of Mankind. New York, Harcourt Brace, 1924. pp 370.
Analysis of numerous philosophic concepts from the point of view that "only symbolic knowledge is possible." The mind invents fictions about the external world which are theoretically worthless but practically valuable.

312 VEBLEN, T.
The Engineers and the Price System. New York, Viking Press, 1921. pp 169.
Economic productivity is being held down in order to keep prices up due to growing estrangement of business management from the industrial process. Management's dependency on the engineer suggests an avenue for solving the problem.

313 VECCHIO, G. del
"L'Evoluzione Dell' Ospitalita," *Revista Italiana di Sociologia,* 1901-02. pp 12.
Historical consideration of hospitality and fear of strangers (the earliest form of nationalism). Traces development of rights for strangers, attributing slowness to conservatism of legal and social institutions. Private hospitality decreases and public rights increase.

314 VICO, G. B.
The Autobiography of Giambattista Vico Ithaca, N. Y., Cornell U. Press, pp 240.
The 18th century Italian philosopher recounts the circumstances that led him to write his own works and develop his "new science."

315 VOISE, W.
"The Renaissance and the Sources of the Modern Social Sciences," *Diogenes,* 23, Fall 1958. pp 22.
Finds the seeds of the modern scientific attitude that human conflict is the essential element of history and that the scholar must look to the facts, in Renaissance writings, particularly on historiography.

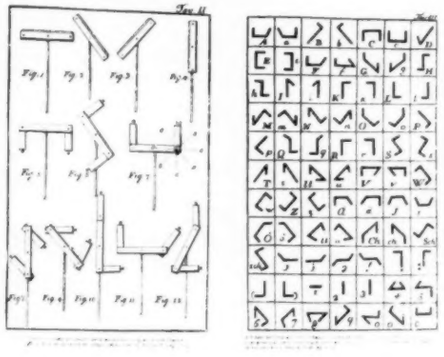
316 VOLTAIRE
Candide. London, Folio Society, 1948. pp 136.
Eighteenth century novel satirizing the Church, the aristocracy, business, the idea of progress and the idea of free will. Particularly critical of optimistic views of prospective social improvements.

317 VUCINICH, A.
The Soviet Academy of Sciences. Stanford, Stanford U. Press, 1956. pp 157B.
A study of the organization of scientific inquiry in the Soviet Union and the social role of Soviet science. Social scientists are required to reflect the Communist social myths. The natural scientist is a technologist rather than an explorer, hampered by required emphasis on officially raised problems.

318 WAGNER, D. O. ed.
Social Reformers: Adam Smith to John Dewey. New York, Macmillan, 1934. pp 749.
An introduction to classics of modern social thought through excerpts selected with a view to their impact on subsequent thinkers. Includes early liberalism, 19th century utopian socialism, Christian socialism, economic liberalism, "scientific" socialism, state socialism, workers' control and fascism.

319 WALLAS, G.
The Great Society: A Psychological Analysis. New York, Macmillan, 1914. pp 383.
In the large modern state the influence of men who can resist habit and therefore originate, is of increasing importance.

320 WALLAS, G.
Human Nature in Politics. Boston, Houghton Mifflin, 1916. pp 302.
Much political activity results from impulse and instinct. The more important political impulses include addiction, fear, feeling for property, privacy. Their effects can be traced in political institutions. Psychology can aid political predictions.



A temporary rapid communications system, semaphoric "telegraph," depending on visual transmission and used in the early nineteenth century in Italy and France for private as well as official messages. Soon signals would be transmitted along wires carrying Volta's newly discovered electricity and the visual codes relegated to shipping and railroad signals.

321 WALLAS, G.
Social Judgment. New York, Harcourt Brace, 1935. pp 175.
Unfinished manuscript inquires into the nature, history and possible improvement of the judgment process. The function of modern social thought is to invent new social expedients. Knowledge of the past forms a necessary "half-conscious emotional background" for this process.

322 WALSH, James J.
The Thirteenth: Greatest of Centuries. New York, Catholic Summer School Press, 1907. pp 436.
Analyzes achievements of 13th century in

various fields of human activity, holding it to be period of greatest inventiveness in history.

323 WARD, Barbara
Five Ideas that Change the World. New York, W. W. Norton, 1959. pp 188.
Nationalism, industrialism, colonialism, communism and internationalism, and their effects both n history and on the newly emergent states for whom a synthesis of these ideas is suggested.

324 WATSON, G. ed.
The Unservile State: Essays in Liberty and Welfare. New York, Macmillan, 1957. pp 324.
Essays on the prospects of liberty in the welfare state by spokesmen of British Liberal Party. Offers definitions of liberty and welfare which make them compatible concepts. Raises question as to democracy's ability to voluntarily conserve current resources and convert them at the required rate, into productive capital.

325 WEAD, C. K.
"Contributions to the History of Musical Scales," *Report of the U. S. National Museum,* 1902. pp 45.
Scaled musical instruments evolved through the repetition of elements that appealed to the eye. This beauty of material form incidentally furnished a series of sounds that could be repeated and which give the idea of definite steps in tone.

326 WEBBER, E.
Escape to Utopia. New York, Hastings, 1959. pp 444B.
Analyzes utopian thought through history and distinguishes escapist and realizable projects which are really social welfare plans.

327 WEBER, Max
The Protestant Ethic and the Spirit of Capitalism. New York, Scribners, 1958. pp 292.
Makes correlation between Protestanism and economic development. The Reformation gave status to worldly enterprise.

328 WERTHEIMER, Max
Productive Thinking. New York, Harper 1959. pp 302B.
Structural features of a problem situation create tensions which, in "real" thinking yield vectors in the direction of improving the situation. Cases, drawn largely from mathematics and games, are analyzed in these terms.

329 WESTERMARCK, E.
The History of Human Marriage. London, Macmillan, 1891. pp 64B.
Male-female ties lasting beyond the act of propagation till after the birth of the offspring characterie human behavior from the earliest times.

330 WHITE, L. A.
The Evolution of Culture. The Development of Civilization to the Fall of Rome. New York, McGraw-Hill, 1959.
Criticizes the doctrine that inventions develop in particular areas and are spread by diffusion. Inventions depend on the entire structure of society, so that they cannot originate or even be imported unless society has reached the proper point of evolution. The volume is to be followed by another making predictions for the period 1958-2058 A.D.

331 WHITE, L. Jr.
"Eilmer of Malmesbury, An Eleventh Century Aviator. A case study of Technological Innovation, Its Context and Tradition," *Technology and Culture,* II, 1961. pp 15.
A case study of factors conducive to inventions. A successful human flight with a glider, several centuries before any other similar attempt, is seen as an effort to explain realistically and rationalistically the religious event of the Ascension.

332 WHITEHEAD, A. N.
Science and the Modern World. New York, Macmillan, 1925. pp 296.
The new scientific mentality is even more important than the new science itself for it has altered the metaphysical presuppositions and imaginative contents of our minds. Present thought combines detailed facts with abstract generalization.

333 WHITING, C. S.
Creative Thinking. New York, Reinhold, 1958. pp 168.
Discusses blocks and aids to the production of new ideas, distinguishing between "creative" and "original" thinking. Discusses and evaluates programs designed to stimulate the realization of creative ability.

334 WHITNEY, V. H.
"Resistance to Innovation: the Case of Atomic Power," *Am. J. Sociol.,* Nov. 1956. pp 7.
Development of peacetime uses of atomic energy will not be an immediate or automatic action. As with other technological innovations it may meet with strong resistance reflecting cultural patterns, demography, ecology, and psychological conditions.

335 WIENER, N.
The Human Use of Human Beings: Cybernetics and Society. Garden City, Doubleday, 1954. pp 199.
Elaborates for the layman the thesis of cybernetics that society can be understood only through a study of the messages and the communications facilities which belong to it. Considers the implications of cybernetics for philosophy, learning, language, law, industry, and social organization.

336 WIENER, N.
I am a Mathematician. Garden City, Doubleday, 1956. pp 380.
Autobiography describing influences (contacts, cultural heritage, education, etc.) shaping author's career as scholar, mathematician and inventor.

337 WILSON, G. & M.
The Analysis of Social Change. London, Cambridge U. Press, 1945. pp 174.
Discussion of social evolution in Central Africa. Isolates factors responsible for conflict and change and their respective roles.

338 WITTKOWER, R.
"Individualism in Arts and Artists: A Renaissance Problem," *J. of Hist. of Ideas,* XXII, 3, Jul.-Sept. 1961. pp 12.
The Renaissance places the personality of the artist upon a lofty pedestal. Today's artist is practically modelled after the Renaissance image. The study reports of the sundry subjects: "Their approach to work is characterized by frantic activity alternating with creative pauses; their psychological makeup by agonized introspection; their temperamental endowment by a tendency to melancholy; and their social behavior by a craving for solitude and by eccentricities of an endless variety."

339 WOLF, T. H.
"An Individual Who Made a Difference," *Amer. Psych.,* XVI, 5, May 1961. pp 4.
Conversations with Simon of the Binet-Simon IQ tests, giving a new glimpse into an important piece of history of social sciences.

340 WOLFLE, D.
"Diversity of Talent," *American Psychologist,* XV, August 1960. pp 10.
The need for better understanding of social and cultural factors that stimulate or retard the development of talent, a claim "that it is socially valuable to maximize diversity," and a strategy for so doing.

341 WOODWARD, J. W.
"Making Government Opinion Research Bear Upon Operations," *Am. Sociological Rev.,* Dec. 1944. pp 7.
Cites difficulties of government research and makes recommendations for making it more useful.

342 WOOTEN, B.
Freedom Under Planning. Chapel Hill U. of North Carolina Press, 1945. pp 180.
Treats concept of planning and its effect on the individual on the several levels constituting social behavior. Concludes that planning and freedom are compatible if public spirit of administrators is assumed.

343 WOOTEN, B.

Testament for Social Science. London, G. Allen & Unwin, 1950. pp 192.

Defends the application of the scientific approach to the study of human affairs citing its problems and achievements.

344 WRIGHT, B. F.

"The Origin of the Separation of Powers in America," *Economica*, 13, May 1933. pp 16.

Explains American adoption of separation of powers as based on colonial experience but modified by pressures to regulate large industry.

345 ZELEZNIK, C.

"Some Reflections on Change," *Kyklos*, XIII, 3, 1960. pp 12.

There is no emperical yardstick by which change can be measured either in absolute or relative terms. In the behavioral sciences, "the application of the simple mathematical concepts of movement, speed, rate of acceleration, or deceleration, etc., all will be be more useful at this time than any consideration at all of 'change' ."

346 ZNANIECKI, F.

The Social Role of the Man of Knowledge. New York, Columbia U. Press, 1940. pp 199.

Connection between the individual and his social milieu is the main object of interest. Discusses socially useful types of knowledge and the people possessed of it with particular reference to innovators.

Mercordì addì 6. Febraro 1760.

N. 1.

GAZZETTA VENETA

CHE CONTIENE

Tutto quello, ch'è da vedere, da comprare, da darsi a fitto, le cose ritrovate, le perdute, le trovate; in Venezia, o fuori di Venezia, il prezzo delle merci, il valore de' cambj, ed altre notizie, parte dilettevoli, e parte utili al Pubblico.

One of the two major components of the modern newspaper is shown in the twice-weekly, Gazzetta, which indicates in its emblem that, like the bear, it feeds itself on what is at hand, without going far off. It advertises every service of today's press save the larger news function, which, however, had already been developing for a century in Italy and elsewhere in the form of regular newsletters.

Architecture for Researchers

Robert Sommer and Humphry Osmond

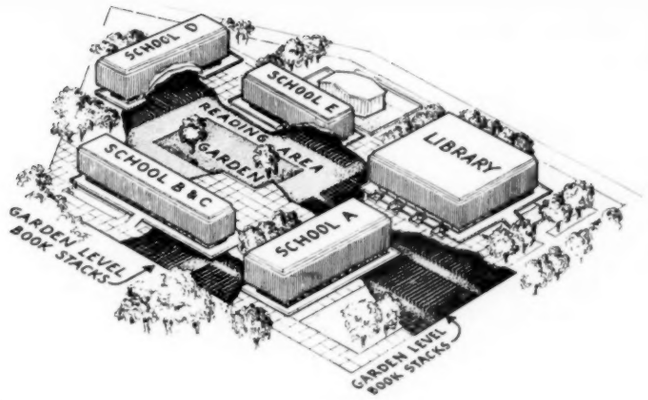
From the University of Alberta comes a coolness towards conventional design in research. The architects and administrators, in expressing their *personalities, may not do well by the researcher's personality. Readers will recall Dr. Sommer's fables concerning keys and power and secretaries and research productivity.*

People who design research laboratories have a special obligation to learn the nature of scientific enterprise and the behavior and temperament of the scientists who will occupy the building. Few organizations depend so heavily on the contribution of one or two outstanding people. The history of science has shown that most important discoveries were the result of a particular kind of person working in a certain kind of setting. Specifically we mean that great research has usually come from extreme introverts working in cramped, unattractive, and isolated laboratories. The vast, costly, and well-lit corporation laboratories have given us little of fundamental importance. William Whyte points out that Kodachrome was perfected in Eastman's huge laboratories but was invented by two musicians in a bathroom. We are not advocating that architects refrain from designing scientific facilities, but rather that they heed the special nature of science and scientists. To this end we will discuss some of our observations on how creative scientists use the space around them. We refer specifically to those who engage in basic research rather than in development or promotion, in which fields the "team approach" has been found to be effective.

The Solitary Animal

Basically the researcher is a solitary animal. He needs a territory of his own and within that territory, a den. He is predatory and exploitive in his relations with others. He wants to see people on his own terms, and avoid them when he is busy. Above all, he needs privacy. He often prefers to be located in an out-of-the-way place—a basement, attic, or the end of a long, dark corridor. The worst possible location is next to the coffee room or the library. He wants to be protected against people who "just drop in for a chat." He would like physical barriers placed between his inner sanctum and the outside hallway. He does not even want to be on one of the main pathways to the coffee lounge. If his office is on one of these main routes, he is likely to be included in the morning and afternoon rituals. There is nothing more frustrating for the researcher than to have friendly or curious folk wander into his office with a cordial "Let's take a break." or a gay "Coffee time!"

The researcher also wants an alcove, a place isolated from the world where he can walk, talk to himself, and think without disturbance. This might be a small private library, inside lab, large closet, or even a gallery, balcony, or enclosed garden. This alcove should be connected with his office, and have no outside entrance. When a scientist starts thinking in earnest, he does not want to be disturbed. Often he likes his physical movements to keep pace with his thoughts. He wants to move rapidly



The University of Pittsburgh's new library-complex seeks to reconcile diversity and unity of motives of access and use.

and if he has no sanctuary, he may step into an exposed hallway where his train of thought will be interrupted by some misguided extrovert.

Some people believe that scientists should be thrown into frequent contact with each other. This is supposed to foster "team spirit" and provide the scientist with added intellectual stimulation. We vigorously disagree with this view and any other that compels a scientist to associate with other people on their terms. We believe there should even be provision for the scientist who wants to eat his dinner and drink his coffee alone. We have known several scientists who go down to the coffee room half an hour ahead of the usual coffee break simply to drink a quiet cup of coffee before their colleagues arrive.

In a good research laboratory, personal relationships are irrelevant and sometimes harmful. It is not the function of a research laboratory to encourage friendships between scientists. More often than not, this sort of arrangement leads to personal feuds and group intrigues. During working hours scientists should come together only to discuss their research efforts, not their personal problems or children's illnesses. It is true that some personal relationships within the laboratory are unavoidable, but they should not be encouraged.

One of us had a well-known professor who maintains that all good researchers are paranoid. He means that they are seclusive, suspicious, reluctant to divulge results, evasive in their replies, and grandiose in their beliefs about the importance of their work.

He could have added that most researchers are very poor company when they are in the midst of an experiment. Either they are so lost in a private world and unable to give coherent answers or they bubble over with trivial details of esoteric procedures. To design a laboratory so that this sort of person must associate with others of similar nature is to create something that resembles a mental hospital dayroom. The architect should try to preserve the separate private worlds rather than force their association.

We should also emphasize that research and teaching are two different functions. A laboratory should not be patterned after a university or schoolroom. Many good researchers are inordinately poor teachers. In fact, the research-attitude of seeking new knowledge is very different from that involved in the continued teaching of present-day knowledge. Not a few researchers who are recognized authorities in their fields protest that they do not know enough to teach graduate students.

Although most writers agree that good researchers are introverts, there have been many notable exceptions. There is little value in discussing relative numbers, since it is only necessary to assume that any scientific enterprise will contain both introverts and extroverts. It is unwise to design the building for the extroverts, since they will seek out other people in any event. The introvert, on the other hand, requires protection against unwanted intrusions. The extrovert may be able to do several things at once and can tolerate interruptions with equanimity. The introvert becomes thoroughly upset if he is working on a problem and someone asks him even the smallest question. As one of our own researchers told us:

> "When someone enters my office while I'm working, I can't wait for him to leave. I'm straining at the bit, trying to appear interested in what he says, but actually I'm just wondering "When will he leave, can't he see that I'm busy" I try to be polite—it's a terrible strain."

In designing a building for introverted scientists, we are in no way penalizing the extrovert. He will seek out companionship in any case. We should only see that he does not disturb his introverted colleagues. The extrovert is also more apt to mould his material and environment to his requirements while the introvert adapts himself to his surroundings.

Although we do not often say this out loud, researchers are usually quite neurotic. This was recognized by the corporation executive cited by William Whyte who preferred a Beta Phi to a Phi Beta Kappa, and felt that the "queers" should go in research. Many people, especially in public life, find it comforting to believe that researchers are well-adjusted Rotarians, "just folks" except that they spend from 9 to 5 in the lab. Anyone who has done research knows how incorrect this belief is. Researchers are usually temperamental, egocentric, mercurial, in addition to being paranoid and intro-

verted. These people can rarely be welded into a company bowling team.

His personality is another reason for isolating the researcher from his fellows. If he cannot avoid coming into contact with other people, he is likely to get into their hair and they into his. It is often assumed that frequent contact among researchers is necessary because a scientist requires constant criticism and discussion of his work. This applies to certain stages in the scientist's work, but it is not sufficient reason to compel scientists to associate with one another during working hours. At the frontiers of research, there are usually only a few people who are qualified to criticize a paper. For example, in biochemistry there are only four scientists who are experts in the structure of adrenochrome, and the closest is five hundred miles away from any other. The scientist cannot be interested in the opinions of colleagues who, although competent in their own specialties, know very little about his work. The role of local criticism and discussion has become relatively unimportant now that laboratories are scattered all over the world. Local discussion and criticism of ideas often ranges from the irrelevant to the redundant. This means that most of the colleagues whose opinion the researcher values will be located outside his immediate environment.

Some Practical Details Of Design

Essentially the architecture of a building should preserve the private worlds of each researcher. The last thing that should be done is to create a "research culture" in which everyone shares the same symbols and values and talks the same language. This would undoubtedly be a culture of technicians rather than scientists. Using the terms of modern anthropology, the architect should aim at creating a scientific community, in which scientists assist one another on various problems when they need help, without creating a scientific culture, which would consist of scientific folklore, special terms, etc.

The interior of a scientist's office should have ample room for filing cabinets, bookcases, and a lot of table space. We have seen few offices of creative scientists where there were not piles of papers on the desk and in the top drawers. Provision should be made for a small cot which could be used for catnaps or even a long, hard evening at the test tubes. There should be very few chairs in the office, unless they are specifically intended for seminars or didactic sessions. One of our colleagues mentioned how he always left stacks of papers and books on chairs in his office. He admitted that this was an attempt to make things as uncomfortable as possible for visitors. He told us:

> I want my office to look as if I'm hard at work every minute of the day, *not* so my employer will give me a raise or a good conduct medal, but that people who come into my office will depart as soon as possible and let me return to my work. When someone enters and asks, "Are you busy?" and keeps coming in, I always stammer a few times, "Well . . . no . . ." and by the time he reaches the chair he's already feeling guilty.

Provision should be made for storing papers and notes so that they are still visible although they are away from the main desk area. This storage place would be specifically intended for ideas and notes about projects still incomplete for one reason or another. Often a scientist feels that a certain observation is extremely important but he does not know what to make of it at the moment. He likes to keep records of this sort in some handy place, where he can return to them at some future date. Such a storage area would be a place where vague an inchoate ideas can be recorded for future use and also a place where the scientist can rummage when he becomes bored or uneasy. If the only place for such stray observations is a desk drawer or formidable file cabinet, then it is unlikely that he will ever return to the idea, much less find his papers. Researchers may live long and do good work in old age, so facilities must be designed for long occupancy.

Laboratories should be built in remote geographic areas, virtually inaccessible by air or rail, and well off the main line of travelling scholars and Ph.D. students on fellowships. Preferably its address should be a box number and its phone number unlisted. The exterior of the building should be unpretentious with nothing to arouse the curiosity of the passerby. There should be no directory of offices inside the building and the elevators should be well into the interior. Waiting rooms of any sort should be avoided along with chairs in the outside hallways. There should be a central telephone placed far away from the scientists' offices. No outside calls should come to the centre of the building, and all phone messages should be taken by a cold but efficient secretary. A further precaution is to station outside all scientists' offices secretaries who have strict instructions to discourage casual visitors.

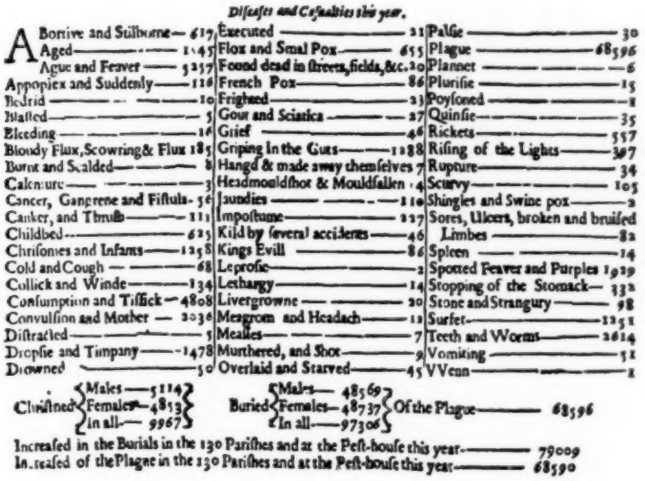
Many of these problems were not so acute fifty years ago when scientific work was confined to a few wealthy eccentrics and university professors working alone in their basements. Nowadays large laboratories make it necessary to keep scientists out of each other's hair. Previously we compared the laboratory with the mental hospital. From the standpoint of the architect, the goal in designing a mental hospital is to get the patient out of his private world. In designing a laboratory, his aim is to preserve the private world of each individual scientist.

Organization for Scientific Productivity

Research in the Sociology of Science

by

Gerald Gordon,
Odin Anderson
and Sue Marquis



Diſeaſes and Caſualties this year.

Abortive and Stillborne	617	Executed	21	Palſie	30
Aged	1545	Flox and Smal Pox	655	Plague	68596
Ague and Feaver	5257	Found dead in ſtreets, fields, &c.	20	Planet	6
Appoplex and Suddenly	116	French Pox	86	Pliriſie	15
Bedrid	10	Frighted	23	Poyſoned	1
Blaſted	5	Gout and Sciatica	27	Quinſie	35
Bleeding	14	Grief	46	Rickets	557
Bloudy Flux, Scowring & Flux	185	Griping in the Guts	1288	Riſing of the Lights	307
Burnt and Scalded	8	Hanged & made away themſelves	7	Rupture	34
Calenture	3	Headmouldſhot & Mouldfallen	4	Scurvy	105
Cancer, Gangrene and Fiſtula	56	Jaundies	110	Shingles and Swine pox	2
Canker, and Thruſh	111	Impoſtume	227	Sores, Ulcers, broken and bruiſed Limbes	82
Childbed	625	Kild by ſeveral accidents	46	Spleen	14
Chriſomes and Infants	1258	Kings Evill	86	Spotted Feaver and Purples	1929
Cold and Cough	68	Leproſie	2	Stopping of the Stomack	332
Collick and Winde	134	Lethargy	14	Stone and Strangury	98
Conſumption and Tiſſick	4808	Livergrowne	20	Surfet	1251
Convulſion and Mother	2036	Meagrom and Headach	11	Teeth and Worms	2614
Diſtracted	5	Meaſles	7	Vomiting	51
Dropſie and Timpany	1478	Murthered, and Shot	9	VVenn	1
Drowned	50	Overlaid and Starved	45		

Chriſtned { Males 5114, Females 4813, In all 9967 } Buried { Males 48569, Females 48737, In all 97306 } Of the Plague 68596

Increaſed in the Burials in the 130 Pariſhes and at the Peſt-houſe this year 79009
Increaſed of the Plague in the 130 Pariſhes and at the Peſt-houſe this year 68590

Section of a Bill of Mortality, London, 1665, giving the causes of death. The beginnings of modern censuses were in such "bills" that go back to the early 16th century in England. Here were also the origins of statistics in so-called Political Arithmetick.

A description of one of the more significant research projects in the organization of creativity is presented for general information and criticism by the authors, who are with the Health Information Foundation.

Science has emerged in the latter half of the 20th century as one of the major endeavors of mankind. Incalculable sums of money and resources are being expended either directly or indirectly upon scientific research and there is every indication that these costs wil be extensively increased in the future. In part this is due to one of the major characteristics of successful scientific research — the germination and development of new problems for exploration. Each new advance provides more avenues for the expenditure of money and resources. For example, the expenditures leading to the first practical airplane are infinitesimal when compared with the costs of refining and developing the airplane. Given limited social resources and the almost infinite variety of potentially viable research projects, the resources available for research will generally be less than the demands. Under these circumstances decisions must inevitably be made for the allocation of the available manpower and funds; decisions made in terms of the maximum utilization of limited resources for the achievement of explicit objectives.

Attention has therefore been directed to studying ways and methods of effectively utilizing available manpower and funds. In increasing numbers, behavioral scientists have been examining factors related to the identification and development of scientific talent. However, comparatively little research has been directed toward studying the relationship of the scientists' work setting to the nature and quality of his work.

This may in part be due to the value placed on scientific freedom, and the folklore regarding the individualistic nature of scientific investigation which has lent a sacrosanct aura to the process of scientific inquiry. But when it is common for research projects to cost more than $100,000 and projects in excess of millions of dollars occur, the nature and structure of the organization necessary to support, maintain, and carry out such research has an important bearing on their success. The failure to understand the relation between organizational setting and scientific accomplishment can and has resulted in the development of organizational structures which inhibit rather than promote scientific research.

In an attempt to study this relation, we have investigated the organization settings of 250 research projects dealing with the social aspects of health.* These projects were selected from the *Inventory of Social and Economic Research in Health*— an annual listing of current research regarding the social and economic aspects of health. Studies included in the *Inventory* are derived through questionnaires mailed to universities, foundations, individuals, etc., concerned with studies of health. The Foundation attempts to be as comprehensive as possible in its listings. The universe of our study consists of all projects listed in the 1953 to 1960 inventories dealing with the

*Stimulated by a grant from the National Tuberculosis Association to Health Information Foundation to explore social research in patterns of disease, particularly respiratory diseases.

social-psychological aspects of disease. As the projects are listed in the *Inventory* without regard to their state of completion or quality, the sample represents published studies as well as those which never reached a publication stage, or were published in out of the way journals. This procedure has two advantages. It enables us to examine studies which have never been published, and eliminates the biases of an editor in choosing an article or book for publication.

In the initial phase of the study, the Project Director listed in each of the 250 studies was sent a questionnaire concerning: his own educational and research background, the structure in which the research took place, the communication nets, and the aims, problems and significance of the research. Over 90% of the questionnaires have been answered. In accordance with the design of the questionnaire, tabulations and cross tabulations will include runs concerning: professional training, problems encountered in doing research (staff, financing, time, etc.), problems encountered in inter-staff relationships, problems of communication between researchers and others.

The second phase of the study concerns the significance and quality of the research. Any attempt to study the effect of organizational structures upon research is faced with the difficult problem of developing acceptable criteria by which to evaluate a research project. Among the major methods used to evaluate research are 1) the number of publications resulting from given studies and 2) the number of patents resulting from a study. Both methods have limitations when applied to the study of current scientific organizations. Among these are the facts that many investigators only publish a given finding once and then move on to other studies, and many studies either do not yield patents or the investigators do not seek them. In addition both methods require a considerable lapse of time before it is possible to evaluate a study and thus would be useless in the analysis of contemporary scientific organization.

We decided to utilize in our evaluation procedures three panels of experts—a panel of 60 social scientists, a panel of 60 physicians, and a panel of 60 health administrators. The members of the social science panel were chosen on the basis of their selection by the members of the Medical Sociology section of the American Sociological Association as leaders in the field of medical sociology. The members for the other two panels were chosen on the basis of their acquaintance with research, leadership, and administrative positions in the health field.

While we recognize that it is impossible to always judge the future import of a research project, we do feel that in terms of knowledge and experience with ongoing research a panel consisting of acknowledged leaders in the health field should be in a position to judge the value of a research project. While we cannot test whether this assumption is true, we can test the extent to which there is intra-panel and inter-panel consensus concerning the value of research. As leaders in the health field, the opinions of our panel members serve as guidelines to organizations and institutions in planning their research. It is important to know whether these opinions are based upon idiosyncratic or universal criteria. In short, we want to know whether the members of a given panel can agree among themselves as to what is and is not worthwhile research.

By utilizing three panels we are also in a position to explore areas of misunderstanding among the three groups which can limit the effectiveness of research. Specifically, we will be able to explore differences between administrators and researchers as to what is and is not good research and the degree to which they agree on the problems requiring investigation. Some hypotheses in this area that we are testing are:

1. Sociologists have a greater consensus of agreement concerning what is and is not meaningful research than do administrators and physicians.

2. Sociologists, administrators and physicians differ as to what they feel are important problems.

3. Physicians will tend to rate the quality and value of the research lower than will the administrators.

4. Social scientists will rate theoretically oriented studies as of more overall significance than will administrators.

Each panel member will evaluate 10% or 25 of the 250 studies. The 25 studies will be selected at random from the universe. It would be desirable to have the panel evaluate a study on the basis of all material resulting from it. We could not, however, reasonably expect the members of our panel to devote that much time to the evaluation. As a compromise between the ideal and the possible, we are submitting to the panel members summaries of the methodology findings of each study they are to evaluate. The basis of each summary is the major publication of the study as determined by the Project Director. In addition, we have asked each Project Director to summarize the major findings of his study. We have made it a point to include these findings in addition to other data we think significant.

Each panel member will be asked to evaluate the projects in terms of four criteria:

1. How important the research is in terms of disease control and treatment.

2. How productive the research was—the extent to which the research represents an addition to our knowledge of the socio-psychological aspects of disease along established lines of research or as extensions of previous theory.

3. How innovative the research was — the degree to which the research represents additions to our knowledge of the socio-psychological factors of disease through new lines of research or the development of new theoretical statements of findings which were not explicit in previous theory.

4. How significant the results of the project are or will be in disease control or treatment.

If concensus concerning these criteria can be obtained, we will utilize these evaluations as the dependent variables in our examination of the relationship of organizational structure to scientific investigation. Among the hypotheses we intend to examine are:

1. There is an inverse relationship between the social factors leading to productivity, and the factors leading to innovation.

2. Interdisciplinary research will yield more innovations than non-interdisciplinary research.

3. Research conducted by a team will be more significant than research conducted by an individual.

4. The greater the degree of conflict on an intra-staff level, the greater the degree of innovation and the less the degree of productivity.

5. Where role relations are well defined, productivity increases.

6. When non-researchers exercise direct control over research, both innovation and productivity decrease.

We recognize this research is a preliminary and limited step in our understanding of the sociology of science. We are hopeful however, that while our findings will be derived from a limited area of scientific investigation (disease control) the universal characteristics of the scientific process will enable the findings to be applied and tested in other substantive areas of scientific research.

Writing from the University of Arizona, a psychologist sets forth a general attitude towards innovation in politics and government, along with several suggestions of inventions to be perfected.

Democratic Control Through Social Invention

by **William J. MacKinnon**

In this age of control, interaction between ethics and new social inventions may be the best response to antidemocratic threats posed by concentrations of the power to influence people.[1] The present paper attempts to contribute to this approach by considering some political inventions and their social effects. It touches upon liberalizing methods which have already emerged from reason and entered political practice. By suggestion or example, it also points out fields in which further inventions might increase the range of free choice experienced by the citizen as he votes or communicates politically. These would protect him especially from threats to his income or status should he engage in legal but nonconformist political behavior. They would also provide peaceful means of spreading wealth and respect widely. When diffusion of these values increases, democratic control through their transformation into political power likewise increases. The consequent sharing of values would unite and strengthen a democratic people for their competition with totalitarian nations.

The directions so indicated might prod potential researchers on democratic institutions to develop new political techniques. They might also guide unattached intellectuals in their task of institutionalizing new political practices, when, as sometimes happens in this century, they are called upon to assist in framing a good constitution. These new politico-social inventions have become possible because of theoretical and methodological progress in behavioral science and the electronic sciences of communication and computation.

Anonymous Communication

The philosopher Spencer once described a dilemma facing an English tenant farmer. The landlord of the farmer had threatened him with eviction if he voted for a Liberal, as he wished to do. Eviction might have entained prolonged inability of the man to feed his children. The example reveals a subversive effect upon political democracy once brought about by concentrated and inherited wealth. Fortunately, a social invention, the secret ballot, did much to counteract oppression in such gross forms. As an institutionalized political practice, the secret ballot has worked effectively for freedom and welfare.

Unfortunately, man is not as free to express his political orientation in speech or writing as he is to express his will at the polling place. The Fund for the Republic of the Ford Foundation has performed meritorious service in sponsoring investigation of the socio-economic pressures inveighing against civil liberties intended by the Bill of Rights. To the

pressures of social contempt and ostracism can be added the threat of economic sanction as in in the academic dismissal. Spencer's tenant farmer may have his analogue in today's nontenurial professor. Newspapers in the United States, furthermore, have often not been common carriers of opinion, nor unbiased representatives of the two political parties. Economic interests of publishers and advertisers affect the information and values presented in the press, and on some matters the people's outlook reflects the bias and prevents nonconformist expression.

What might be done to achieve balance and objectivity in political communication? Is there any device analogous to the secret ballot? Could anonymous messages which libel no person or group be the answer? To some extent the private opinions of people have already found a mode of expression in the opinion researches of Gallup, Likert, Centers, Kinsey, Stouffer, and others. The suggestion box and the clinical protocol are often the media for the circulation of tabooed opinions obtained from unnamed respondents. (In the history of liberty, it might be added, the anonymous book or pamphlets holds a conspicuous place.) New social technology, e.g., sampling techniques and content analysis, have speeded up the release of the change potential contained in nonconformist and creative opinion when it is protected by anonymity.

Research on and institutionalization of anonymous communication holds forth the promise of perfecting a continuous device for social growth and equilibrium. Some organizations within a society, such as a university or a consumer's cooperative, might experiment with the effect of stockpiling brief anonymous messages on a variety of controversial topics selected individually by the senders, or synopsizing opinions focused on a single controversial issue.[2] To permit some appraisal of the commucators without revealing their identities, the informations received by the interpreters should include statements about communicators' general occupations, levels of education, and similar relevant attributes.

Publication of nonconformist opinions would encourage expression by people of views similar to the published ones, who had previously been fearful of expressing them because of feeling that their ideas were unique or idiosyncratic. To provide for such practices in a political constitution of a nation-state might propel a whole people toward the open society. It would do so more surely, however, if the voting process, once improved by the secret ballot, developed still further toward freedom and flexibility.

Autonomous Voting

Even with the secret ballot the citizen encounters barriers when voting; he faces Hobson's choices—or near-Hobson's choices. The proposals or the candidates presented to him may be too few or too similar. He has no ready option between voting directly for proposals or indirectly through representatives who will decide among the alternatives. He lacks a device for expressing the subtle gradations of his political preferences.

What kind of voting system would extend past improvements and add to the freedom experienced by the voter at the polls? What general electoral methods, by granting a larger degree of autonomy to the wishes of the individual as he votes, would merit the name, "autonomous voting"?

The Initiative by a New Voting System

For the sake of simplicity let us first exemplify some of the elements that might be embodied in a voting system in which the people participate in a flexible form of the *initiative*. The system is designed to increase the utilization of intelligence, impartiality, and representativeness.

Let us assume that a social problem confronts the people. Various political parties or pressure groups have each proposed an alternative proposition for solving the problem and have each gathered the necessary legal minimum number of signatures, say 1 per cent. Propositions A, B, C, D, and E represent a broad range of political viewpoints.

In a preliminary election, the voter would cast a total number of votes, or points, from 1 to 100, inclusive, the exact size of this total being chosen by himself, among the propositions in any way he wished, including the assignment of *O*'s. He would then cast another total of votes, chosen within the same limits, among *any* citizens, excepting himself, whom he wished to serve as delegates, or representatives, in deciding the issue. Thus continuous-preference voting would replace the all-or-none principle; moreover, universal candidacy to become a wielder of delegated and weighted power in making a specific voting decision would supplement the principle of the universal ballot.

In the counting process, the indirect votes that a delegate received would be reduced in number, before allocations to alternatives, in the same proportion as he himself reduced from 100 the total number of votes he assigned to the alternatives, and this remainder would be distributed among the alternatives in the same proportion as he distributed his own votes among them. (Because of a happy cancellation in numerator and denominator, the number of votes going "through" delegate X to proposition A, for example, would simply be .01 times the total received by A, times the number cast by X for A.)

The results would reflect each voter's regard for himself, others, and the propositions. Any elector could prevent any votes being channeled through himself as agent for any proposition simply by writing a *0* beside the given alternative. In each of the two series of choices, however, he would be required to cast at least one vote. His right to select anyone he wishes as a representative would imply his duty of serving as a representative himself, though he could reduce by 99 per cent any channelization of received votes through himself as delegate.

With calculations including decimals, the maximum number of votes cast directly among all alternatives would equal the maximum channeled indirectly, specifically, 100 times the number of voters, and the minima would simply equal the number of voters. This preliminary election would reveal the strength and variety of opinion.

In the final election, each citizen would vote in a run-off between the proposals which received the largest and next-to-largest combined totals of direct and indirect votes. The method of voting and counting would be the same as in the preliminary election except for the reduction in the number of alternatives. The bill passed into law would be the one receiving the greatest total of direct and indirect votes combined. The final result would therefore rest upon majority consent in the sense of more than half the number of all votes either cast personally for a measure or redirected representationally with the consent of the ultimate sovereign, the citizen.

Autonomous Voting in Elections

The general principle of autonomous voting, it may be pointed out, could easily operate in the election of aspirants to political office. In that case, alternatives A, B, C, D, and E would consist of individuals competing to hold the same elective position. The method could also incorporate higher-order, indirect voting in which the ordinary electors would assign a further set of votes to individuals who would determine the allocation of these points to other individuals who, in turn, would decide the distribution of these received votes among the propositions or would-be office-holders. With some modification autonomous voting might provide a new means for legislative bodies to pass bills or assign members to committees.

Two hypotheses may be ventured regarding experimental tests of this voting system. One is that individuals in groups which become thoroughly familiar with some such variant of autonomous voting in realistic settings, say a labor union or university faculty arriving at a practical decision, would say they felt freer under the new voting system than under the old. A second very general hypothesis applying to seasoned discussion groups is that autonomous voting as contrasted with ordinary voting would lead to a higher percentage of "votes" going to correct solutions to logico-mathematical problems and to expert resolutions of standardized human relations problems.

The reader may wonder what agency would manage the general operation of anonymous communication and autonomous voting, and whether the agency would corruptly manipulate outcomes. Suggestions will be made to reduce the obscurity and guard against the danger.

Protective Duplication Of Agencies

The separation of powers, evolving from the thought of Montesquieu and Locke, was an invention to prevent autocratic control. Undivided power at the top of a hierarchy holds forth the possibility of leaders' behavior becoming corrupt, tyrannical, and unconstitutional. With the instruments of behavioral science at their disposal, dictators and demagogues of the future might become more efficient than any of their predecessors. Yet democracy in the sense of shared power requires the use of new social inventions. What can prevent the misuse of these tools or their concentration in the hands of the few?

One preventive is to combine governmental founding of an agency with the agency's independent subsequent operation. Another is the multiplication of agencies that independently conduct the same function. The similarity of the results of independent agencies carrying out identical functions provides a check upon their honesty. The American Institute of Public Opinion and the National Opinion Research Center, as examples, both using the same interview schedule and the probability method of sampling, have produced nearly identical results in a nationwide survey of opinion. With several such agencies conducting national surveys in this manner, agreements to submit identical or near-identical percentages in reporting the people's views would be unlikely. Furthermore, state survey agencies could provide additional checks upon honesty. Multiple auditing agencies that would examine the filled-out interview schedules could constitute a supplementary checking method. All told, such considerations make it appear likely that anonymous communication and autonomous voting could be provided with adequate safeguards against manipulation.

The devices and their safeguards would cost relatively little. The political communication-and-voting system compared in terms of monetary expense with the economic system of a society is like the nervous system of the human body compared in terms of energy requirements with the remainder of the soma. The nervous system can operate for hours with a relatively minute supply of energy.

Constitutionalism Unlimited

The overall outlook of this paper aims at a constitutionalism revitalized by the production of needed political invention. The rapid growth of science makes the development of new and better political constitutions both necessary and possible. What is needed now is a relative-utopian mentality, to use Mannheim's terms. The relative-utopian mentality will build plans for the good society. It will attend to the laws and techniques that have been discovered or invented in the natural and behavioral sciences. It will seek the creative synthesis of new cultural and material elements, first in thought and later in practice. It will attempt to formulate such syntheses in a new constitution or to cultivate the relevant background intelligence for the drafting of a new constitution. It will, however, be relatively realistic. Its plans or constitutions will be such as to be feasible, given changes in the social structure

such as occur with time, or differences in social structures such as are found over the globe.

Progress is accelerative, a boon for the relative-utopian mentality. The current slow-down in the production of utopias need not last. Orwell's negative utopia featured a "telescreen" permitting state officials to look into the homes of individuals. Why could not some enterprising engineer, goaded perhaps by a behavioral scientist, examine the nature and feasibility of a voting machine in every home, complete with means of identifying the voter to prevent fraud, yet keeping secret the nature of his vote from anyone but the voter himself. The device would obviously capitalize on the behavioral law of less effort as applied to elections.

Again what would be the cost of providing monetary inducement to people for passing a simple quiz on the major facts and arguments related to alternative current proposals for changes in the laws? To pay people for learning would probably result in greater intellectual mastery and fewer emotional disturbances than to fine them for failing to learn. The payment practice would simply put to work in the service of political enlightenment the behavioral principle of positive reinforcement. Here is a case where an economic factor would strengthen political democracy.

The spread of art, science, and learning promises to restore vigor to constitutional, democratic government. In the nations where these factors are strong, constitutionalism may decisively overcome the dangers of corporate concentration and mass prejudice. Social inventions may be the crucial factors if they are available when needed for constitutional or statutory reform both in these nations and in some poor but developing areas of the world.

[1]Alfred De Grazia, "Social Invention in the Age of Controls," *American Behavioral Scientist*, IV (October, 1960), p. 38. There are several continuities between the present article and this earlier one.

[2]See William J. MacKinnon, "Behavioral Research and Intergroup Communication," *Journal of Psychology*, XLIX (April, 1960), pp. 339-348 for further research suggestions on anonymous communication.

IN THE NEWS *(continued from page 2)*

ated assault on the problem by united behavioral disciplines; the increased connection between college and high school teachers however is all to the good) . . . A change in direction of the big Free Press-Macmillan Encyclopedia of Soc. Sci. plan has broken the scheme down into area editors with autonomy . . . Prof. Endicott of Northwestern computed on basis of Census figures that college grad. earns $175M more in lifetime than mere HS grad; that comes to $240 earned for a day of class, he says; "in 30 years of teaching the professor adds a total of $13,200,000 to the earning power of college graduates. Who else in our society makes so great a contribution to the economic welfare of people?" We agree with Endicott that the figures are funny, but they are no sillier than some that are used for negotiating annual work contracts or computing economic productivity or discovering "net value added to product."

Letters to the Editor

Contra Chinese Operations Research

The Chinese adoption of "operations research" may not be as significant as your seem to believe. In all of the practical applications I have seen, the applications of modern techniques are simple to the point of simple-mindedness. The linear programming, or other advanced method, is not actually applied, although some rather ceremonial bow toward arranging the data on a matrix is common. In practice, however, the Chinese seem to be unable to solve any problem which would be recognizable by Americans as involving mathematics. Changes may be taking place, but as far as I can see from the examples I have examined, the "operations research" consists solely of making common sense suggestions for management improvements under the cover of some talk about modern methods.

In general, however, *ABS* goes from strength to strength.

Sincerely,

Gordon Tullock
Associate Professor
University of South Carolina

ON THE COVER

"Vaccine comes to grips with the Faculty." In 1799-1800 the French public was agitated over the question of vaccination for smallpox. Academic opposition to the new practice aroused caricatures of this order. From Augustin Challamel, *Histoire-Musée de la République Francaise* depuis l'Assemblée des Notables jusqu'à l'Empire. Vol. II, p. 194, Paris: Challamel, 1842.

Re Social Facts Column

In response to your invitation to comment on your page, I want to applaud it vigorously. I hope you will keep it up and develop it at least for a year's trial.

This might mean keeping a check list of the eleven major institutions or segments of community living (family life, education, economics, politics, welfare, religion, health, recreation, art, science, mass communication). If the facts were drawn from all these institutions (not necessarily equally, but covering the waterfront eventually) you will have the highest probability of interesting the most readers by harnessing the principle of individual differences to work for you.

To interest your clientele spread over the nation, current U. S.-wide facts would be of most interest, but comparison with world figures would be good wherever available. Comparable facts for States, cities, and sub-areas in the United States should be averages and not limited to subparts of the country.

Would it be too space-consuming to number each fact, and in very small type at the end, state the source, simply so a follow up could be made?

The first sample is an excellent set that has provided us with several table conversations already.

Sincerely,

Stuart C. Dodd, American Institute
For Economic Research